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## REPORTS

ON THE

## SANITATION OF SHIPS AND QUARANTINE,

PREPARED BY

THE SUPERVISING SURGEON-GENERAL,  
U. S. MARINE HOSPITAL SERVICE,

FOR THE

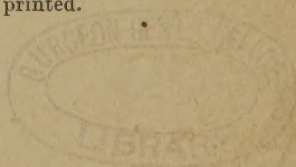
USE OF THE INTERNATIONAL AMERICAN CONFERENCE.

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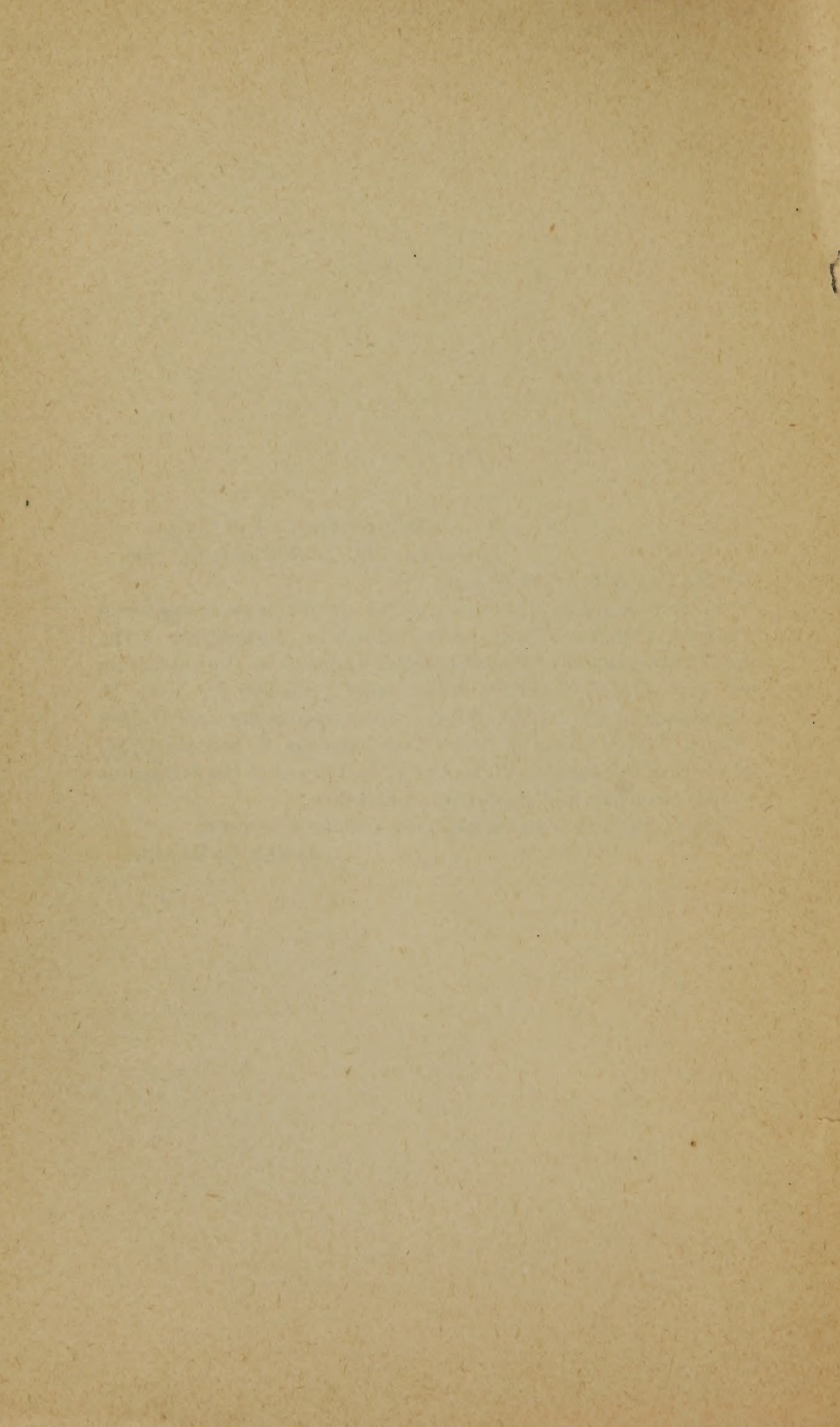
*To the President of the Senate :*

In accordance with section 5 of the act of Congress approved May 24, 1888, I transmit herewith, for the information of the Senate and House of Representatives, reports on the sanitation of ships and quarantine, which were prepared by John B. Hamilton, M. D., LL. D., Supervising Surgeon-General United States Marine Hospital Service, and George M. Sternberg, M. D., major and surgeon U. S. Army, for the use of the Delegates to the International American Conference.

I have the honor to be, sir, your obedient servant,

JAMES G. BLAINE.





## REPORT ON THE SANITATION OF SHIPS AND QUARANTINE.

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By JOHN B. HAMILTON, M. D., LL. D.,

*Supervising Surgeon-General, U. S. Marine-Hospital Service.*

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SIR: I have the honor to submit for such action and reference as you may think appropriate in connection with the labors of the International American Congress, a report on the subject of the sanitation of ships and quarantines, as requested by Consul-General W. P. Sutton, chief clerk of said congress.

Pestilence is the common enemy of mankind. It recognizes no political divisions, and unopposed it stops at no artificial boundary.

It is therefore of universal interest that united effort shall be made, whenever opportunity offers, to circumscribe, limit, and eradicate the diseases which produce pestilence at their beginning. The pages of history have too fully recorded the calamitous epidemics of the past for us now to forget what countless human miseries accompany their march. The plague at Athens and London; the sweating sickness of Mediæval times; the ravages of cholera in the Orient, and in our day the extensive losses of population by cholera and yellow fever, admonish us that this enemy pestilence is too active to be appeased by ordinary rules of diplomacy. Applied science alone can eradicate pestilence. Applied science, however, is helpless without full obedience to its axioms. No potentate or power, however exalted, can hope to reap the benefits of scientific knowledge without yielding freely to its requirements.

This Congress is fortunate in being free from any former declarations. It has within its scope the opportunity of making such recommendations to the several countries sending delegates as by their adoption may insure the limitation of the epidemic diseases now affecting us, and may hope to take



at this time and place the initiative steps toward the final eradication of such as are endemic on our shores.

"It is a beautiful spectacle," says Pastoret,\* in speaking of the Rhodians, "to see a nation more occupied with commerce than with conquest, governing its people with firmness, yet extending the influence of its legislation to all parts of the earth."

The warlike Goth failed to leave impress upon European legislation, but the little Republic of Rhodes, engaged wholly in commerce, established the principles of maritime law and laid the foundation of the Roman nautical code. The voice of antiquity thus assures us that the regulations of peace, founded on right common to all, are more enduring than edicts of conquest made in the interest of a single nation.

Let this congress of peace and commerce place firmly and broadly its formulated opinions on the records of the history of this time, and let it here resolve to use its utmost influence in the eradication of one of the greatest public enemies, which is not only a destroyer of human life, but as well a destroyer of commerce.

For commercial purposes it is not necessary that the ancient quarantine, with its barbarous exactions and cruel imprisonments, shall be sustained, but the modern system must be enforced, if commercial relations are to be successfully maintained at all seasons between the Americas.

It is well known that certain States of this Union have, in pursuance of the right of self-defense, adopted the plan of non-intercourse during certain seasons of the year, because of imperfect equipment of their sanitary defenses and the hesitancy of the General Government to assume the responsibility of their sanitary coast guard; but a broader view of this question taken by the last United States Congress has resulted in the initial appropriation for an extended national quarantine system.

Not only is shipping harrassed by being barred out of certain ports at certain seasons, but the excessive fees sometimes extorted are in some cases almost prohibitory of traffic. For these reasons, if for no other, it has become apparent that the carrying trade of the world demands that municipalities and states must be forbidden from collecting port fees, and that

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\* *Dissertation sur l'influence des lois Maritimes des Rhodiens*, 1784.

each general government must provide its own external quarantine service irrespective of local authority. Our eminent authority on quarantine, Prof. Joseph Jones, of New Orleans, remarks on this topic:

Is it just, is it right that the pestilence-stricken ship should bear all her expenses, and suffer all that the safety of man may demand and that avarice and cowardice may suggest? Has not civilization advanced to that stage, and are not the civilized and Christian powers of the world sufficiently strong, wealthy, and enlightened to establish a uniform system of quarantine? (Transactions Ninth International Medical Congress, Vol. IV, p. 329.)

The consideration of the sanitation of the ship necessarily causes us to look to the condition of the cargo when shipped, the personnel of the passengers and the crew. The sanitation of ships and as well the administration of quarantine can be much simplified by the recognition of an additional article in the international code, which when admitted will cause each nation to use reasonable vigilance in destroying disease centers within its own territory. When this shall be accomplished yellow-fever germs and cholera germs will no longer be transported. A vigorous effort was made by this Government in November and December, 1888, and January, 1889, to destroy all yellow-fever fomites resulting from the Florida epidemic of 1888, it is believed with entire success; and we may fairly claim for the Government of the United States that every effort has been made to prevent the shipment of yellow-fever fomites to any part of the world. The measure of success attending these efforts is manifested by the fact that not a single case of yellow fever has developed within our limits during the year 1889, except those imported cases arrested at our quarantines. Nor has any case in foreign quarantine been reported as chargeable to us. A long time would necessarily elapse before those endemic homes of yellow fever and cholera could be placed in such hygienic condition that entire destruction of the pestilential pathogenic germs would follow, but with the present knowledge of the natural history of epidemics, it is not utopian to assert that it might be done.

The question now is, will enlightened international action compel the trial? The belief that the time is now ripe for action of this kind is not simply the belief of an individual. The officers concerned in the execution of the municipal quarantine regulations in this country, together with those managing



the national quarantines, met in convention at Montgomery in March, 1889, and in reference to this question adopted the following resolution by the following vote :

*Resolved*, That this conference is of opinion that it is a duty devolving on all nations to take measures to eradicate any plague center from their territory, and that the existence of such plague centers is a menace to all other nations, and that our State Department be requested to take measures through proper diplomatic channels for the conveyance of this opinion to the governments deemed obnoxious to the opinion as herein expressed.

It is easy to see in what manner the adoption of this principle as an article in the international code would lighten the burdens and responsibilities of quarantine officers, and therefore receive their support, but the highest exponent of medical opinion in this country, the American Medical Association, at its session held in June, 1889, affirmed the resolution as the deliberate judgment of the medical profession of the United States.

In fact, it is not a strained interpretation of the *jus gentium* that declares it an act of hostility for a nation to allow fomites of a known epidemic disease to be exported to another without a reasonable effort to prevent it. I have elsewhere suggested that it should be viewed as an equal act of hostility the sending out of a piratical craft or a ship infected with yellow fever, or cholera, or other contagious disease.\*

The recognized necessity for the ascertainment of the sanitary condition of the country from which the vessel comes has led, in this country, to the adoption of a law requiring that each consular representative of the United States shall furnish his Government full information on this subject. The detailed instructions whereby the law is executed will be found in the existing Consular Regulations.†

Even this safeguard has been found insufficient in certain epidemics that have recently occurred in Europe, and they are manifestly inadequate at Havana. The Spanish province of Cuba, owing to its geographical situation, and the character and volume of its trade with the Americas, is a constant source of solicitude to all sea-ports within the yellow-fever zone. This Government has therefore maintained a sanitary inspector at that port, nominally attached to its consulate, whose duties

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\* International Comity in State Medicine, Journal of the American Medical Association, August 24, 1889.

† Vide U. S. Consular Regulations, p. 114-117.



require that he shall carefully certify the sanitary character of the vessels, the passengers, and the cargo of all vessels bound to the United States. When merchandise of a suspicious or doubtful character is presented for his certificate he declines to furnish it. In consequence, the shipping agents do not take the responsibility of shipping any of that class of freight to the United States. Should a vessel fail to take the certificate and nevertheless carry the articles, she would certainly be detained in quarantine, and the loss to the vessel in time would be much greater in amount than any possibility of gain by carriage.

When the cholera became epidemic in Europe in 1883, by my recommendation a medical inspector was attached to the consulates at Liverpool, London, Havre, Bremen, Hamburg, Marseilles, and Naples, who, under instructions from the Bureau, made careful inspections of emigrants, baggage, and merchandise bound to the United States.

The last International Sanitary Conference that was held at Rome (1885) unanimously agreed to the proposition that "It is the interest of each nation to assure the salubrity of its sea-ports; it will thus often avoid the invasion of its soil by exotic maladies; and above all will rarely transport upon its vessels endemic disease;" and further, that "In each port it will be necessary to have at all times a sanitary authority, whose mission it shall be to furnish consuls official information relating to the sanitary condition of the port."

That conference also declared, in regard to yellow fever, "that the most effective measures for prevention of diseases of this class are, the sanitary improvement (*assainissement*) of cities and of vessels sailing from infected ports, isolation of the sick, and disinfection of infected or suspected articles and localities."

Unfortunately there are some countries in which the local hygienic conditions are bad, and the sending out of fomites is not restricted at the country of departure; therefore until different views become universal, quarantine restrictions of some sort must be maintained upon the carrying trade. To lessen those restrictions to a minimum degree applied science offers various expedients. The hygienic ideal is "a clean ship sailing from a clean port;" and cleanliness is the first important factor in lessening quarantine restrictions. This Government has recognized this fact, and in the general interest, scarcely less than her

own, has issued the following circular addressed to all national quarantine officers:

[Circular.]

### TREATMENT OF FOUL SHIPS.

TREASURY DEPARTMENT, U. S. MARINE-HOSPITAL SERVICE,

Washington, D. C., October 5, 1888.

*To Medical Officers of the Marine-Hospital Service, and others whom it may concern :*

In order to stimulate ship-masters to aid in securing a clean ocean-going fleet the following regulation concerning the treatment of foul ships is hereby adopted, and will be observed at all national quarantine stations :

(1) When a vessel arrives at any national quarantine station from an infected port, and requires disinfection, she will be subjected to ordinary disinfection, as provided in former regulations.

(2) When any vessel shall arrive at a national quarantine station in such foul condition as to render her dangerous from a sanitary point of view, and is found to require cleansing and disinfection, having at any former time within one year been subjected to ordinary disinfection, such vessel will be required to undergo extraordinary disinfection, which, in addition to the ordinary measures, will include holy-stoning, scraping, the taking out of rotten wood, a second disinfection, and interior repainting, all of which will be required before granting a certificate of free pratique.

JOHN B. HAMILTON,

*Supervising Surgeon-General, M. H. S.*

Approved:

HUGH S. THOMPSON,

*Acting Secretary.*

GROVER CLEVELAND.

The effect of this circular is already apparent in the more cleanly condition of the vessels arriving at our quarantines.

The sanitary conference of Rome in 1885 attempted to define the terms "suspected ship" and "infected ship;" but there was no agreement. The practice is to disregard the term suspected and to treat every ship on its merits or demerits, having regard only to its condition at the time of examination and the reported state of the port of departure. The conference made clear their opinion that the initial measures of prevention begin at the port of departure by the adoption of the following:†

(22) The consul of the country of destination will have the right to assist at the sanitary inspections of the ship made by the agents of the terri-

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† Vide Doctor Sternberg's translation of *Résumé* of the conclusions adopted and of the propositions rejected by the technical commission of the International Sanitary Conference of Rome, 1885. Report of the Supervising Surgeon-General, M. H. S., 1886, pp. 278-303.



torial authority, in conformity with the rules which may be established by conventions or treaties.

Adopted by eight affirmative votes (Austria, Hungary, Denmark, United States, Italy, Holland, Portugal, Sweden), against six negative votes (Great Britain, India, Japan, Roumania, Servia, Turkey), and eight abstentions (Germany, Brazil, Spain, France, Norway, Russia, Switzerland).

(23) The loading of the vessel will not commence until it has been put in good sanitary condition, either by the ordinary means or by special measures of disinfection, if considered necessary. For this purpose it will be inspected by the captain and the ship's physician. The result of the inspection will be noted upon the ship's register.

Adopted unanimously.

(24) The doctor will examine the passengers coming from a port where cholera prevails, and will refuse to receive on board those who appear to him to be suspect.

Adopted unanimously, except one abstention (Turkey).

(25) He will see that those who appear to him to be in good condition do not bring on board linen, personal effects, or bedding contaminated or open to the suspicion of being so (suspect).

Adopted unanimously.

(26) Clothing and bedding which have been in use by persons who have died of cholera should never be received on board.

Adopted unanimously.

(27) When cholera shows itself on board a ship while it is at an infected port, those who show the first symptoms of this disease will be immediately sent to the hospital, and all of their effects, such as bedding, etc., which have been in use, will be destroyed or disinfected. The locality in which the sick are found will also be immediately disinfected.

Adopted unanimously.

(26) The "sacks" inclosing the clothing of individuals who have died abroad will be disinfected before a vessel sails.

Adopted unanimously.

Subsequently it was declared that the measures recommended against cholera were in general applicable to yellow fever.

#### THE PRACTICE OF QUARANTINE.

As to the sanitary measures at the port of arrival, they were concisely set forth by the Conference.

#### (3) SANITARY MEASURES AT THE PORT OF ARRIVAL.

##### SUSPECTED VESSELS.

(68) Free pratique will not be accorded until a sanitary inspection has been made, by daylight, by a physician of the port of arrival, which inspection should establish the exact sanitary condition of the passengers and crew, and the fact that the necessary measures of sanitation and disinfection have been rigorously executed at the point of departure and during the voyage.

Adopted by 17 against 2 (Brazil, Spain) ; 2 abstentions (Portugal?).

(69) The passengers will receive free pratique if there is not and has not been on board either death, or case, or suspected case, of cholera.

Adopted by 15 against 3 (Brazil, Spain, Mexico), and 3 abstentions (Denmark, Great Britain, India).

(70) When the voyage has been of less than ten days' duration there will be an observation of twenty-four hours and a disinfection on board of soiled linen and personal effects.

Adopted by 11 votes against 6 (Brazil, Spain, United States, Great Britain, India, Mexico) and 4 abstentions (Austria, Denmark, Servia, Turkey).

Paragraph 69, as above stated, of course only applies to the passenger and wearing apparel then worn. It would be manifestly unsafe to permit baggage to escape disinfection when the vessel had come from an infected port. As to ships found to be infected the following declarations were adopted :

### INFECTED SHIPS.

#### THE SICK.

(71) The sick will be immediately removed to an isolated locality on shore.

Adopted unanimously, save 1 abstention (Turkey).

(72) Disinfection will be practiced as already directed in the articles relating to disinfection.

Adopted unanimously.

#### PASSENGERS AND CREW.

(73) The passengers and crew will be isolated.

Adopted by 17 votes against 2 (Great Britain and India) and two abstentions (United States and Russia).

(74) This isolation will last for five days.

Adopted by 11 votes against 8 (Brazil, Spain, Great Britain, India, Mexico, Roumania, Servia, Turkey), and 2 abstentions (Denmark, United States).

(75) In case the physician of the ship is able to certify that there has not been a case of cholera on board for ten days, the observation may be reduced to 24 hours.

Adopted by 10 votes (Germany, Austria, France, Italy, Holland, Russia, Sweden, Norway, Switzerland), against 7 (Brazil, Spain, Mexico, Portugal, Roumania, Servia, Turkey), and 4 abstentions (Denmark, United States, Great Britain, India).

(76) The passengers will be divided into groups, each containing as small a number as possible, so that if cases occur in one group the time of isolation will not be prolonged for all.

Adopted by 18 votes, against 3 abstentions (United States, Great Britain, India).



(77) The sanitary authority will adopt such measures of disinfection as may be necessary, and will prescribe the measures of prophylaxis which have been approved by this conference.

Adopted by 18 votes, with 3 abstentions (Denmark, Great Britain, India).

#### SHIPS.

(78) The ship will be disinfected in accordance with the directions given in the articles relating to disinfection. All of these measures of disinfection will be executed in presence of and under the responsibility of the chief sanitary authority of the port of arrival.

Adopted unanimously.

#### DISINFECTION.

5. The commission recommends, as means of disinfection against cholera, besides destruction :

(1) Steam at 100 C.

(2) Carbolic acid, chloride of lime.

(3) Aeration.

Carbolic acid and chloride of lime are to be used in aqueous solution.

Weak solutions: Carbolic acid, 2 per cent. ; chloride of lime, 1 per cent.

Strong solutions: Carbolic acid, 5 per cent. ; chloride of lime, 4 per cent.

These means of disinfection will be applied as follows:

(1) For the disinfection of persons the weak solutions should be employed.

(2) For the disinfection of clothing, bedding (*des linges des habits, des couvertures*), and other articles of this kind: (a) destruction; (b) steam passed through the articles for one hour; (c) boiling for thirty minutes; (d) immersion for twenty-four hours in one of the weak disinfecting solutions; (e) aeration for three or four weeks, but only in case the other means recommended are inapplicable.

Articles of leather, such as trunks, boots, etc., should be either destroyed or washed several times with one of the weak disinfecting solutions.

(3) Vomited matters and the dejections of the sick should be mixed with one of the strong disinfecting solutions in quantity at least equal to the amount of material to be disinfected. Linen, clothing, bedding, etc., recently soiled by the dejections of the sick, which can not be immediately subjected to the action of steam, should be at once immersed in one of the strong disinfecting solutions, and left for four hours.

(4) The dead should be enveloped in a sheet saturated with one of the strong disinfecting solutions, without previous washing of the body, and at once placed in a coffin.

(5) Disinfection of merchandise and of the mails is unnecessary; steam under pressure is the only reliable agent for the disinfection of rags (*les chiffons en gros*).

(6) When cases of cholera occur upon a vessel at sea, the locality where the case occurs should be disinfected. The floors and walls of the cabin, or other locality, should be washed at least twice with one of the weak disinfecting solutions, and then exposed freely to fresh air.

In the case of objects of considerable value, which have not been in immediate contact with the sick, and which would be seriously injured by a rigorous disinfection, the physician on board may determine what measures are necessary to protect the sanitary interests of the vessel.

The bilge-water should be pumped out, and replaced by sea-water, at least twice at each disinfection of a vessel.

The closets should be well washed with one of the strong disinfecting solutions at least twice a day.

(7) If the drinking-water is open to suspicion it should be boiled before it is used, and the boiling should be repeated if it is not used within twenty-four hours.

All suspected food should be destroyed, or at least recently cooked.

(8) Hospitals should be disinfected by washing the floors and walls with one of the weak disinfecting solutions, by a subsequent free ventilation and cleansing, and finally by repainting. The wards to be disinfected should, as far as possible, be isolated from those in use.

The latrines should be disinfected at least twice a day by pouring into them the strong disinfecting solutions in quantity at least equal to the amount of the dejections received since the last disinfection.

(9) The clothing worn by physicians and attendants should remain in the hospital, and should be regularly disinfected.

Physicians and attendants should use the weak disinfecting solutions for washing their hands, etc.

Adopted unanimously, with the exception of the delegate from Turkey, who abstained from voting.

I have, as will be seen, made free use of the report of the last International Sanitary Conference, because it is the report of conclusions adopted after full discussions of all interests involved, and while the subject of the prevention of cholera in Europe chiefly interested that body, it is sufficiently obvious that the same rules are applicable to us in the management of our own sanitary defenses. In carrying out the foregoing principles, this Government has adopted the plan of refuge quarantine stations at certain distances along her sea-board, for reasons that will be apparent hereafter. The complete quarantine establishment is an expensive one, and incomplete quarantines are dangerous. The complete establishment comprises a hospital for general diseases, a lazaretto, barracks for temporary detention of suspects, a warehouse with steam disinfecting machinery, quarters for the medical officers, a steam-tug for use as a boarding-boat, and a fumigating-tug. These plans have only recently been adopted in their entirety, and are now (October 1, 1889) being advertised for construction at San Francisco. The expense of construction and equipment of this station will not fall far short of \$175,000, and it is evi-



dent that a few complete stations of this kind will take the place of the many municipal quarantines.

The latter will become eventually simply boarding stations, and vessels requiring treatment will be sent to the nearest Government quarantine station. This result will certainly happen as soon as the port privilege of quarantine fees shall be abolished, and each quarantine establishment shall be maintained by the General Government. If local quarantine fees were abolished, seven-eighths of the incomplete local establishments would disappear.

Much time is required to perfect the quarantine establishments. Our system, instituted as an experiment in 1883, had progressed so far that Congress, in August, 1888, made it the permanent plan, and it is hoped that another year will see the quarantines practically completed.

The newest feature of these quarantines is the plan of disinfection known as the Holt system which with certain modification has been adopted by this Government. This plan allows a vessel to rejoin the commercial fleet in the shortest possible space of time, and, according to the most enlightened sanitary views, is entirely successful.\*

It remains, in conclusion, to consider what international means shall be adopted to render our American shores immune and at the same time reduce quarantine restrictions to the minimum degree. The danger from yellow fever is most imminent nearest the equator. The liability to extension diminishes in intensity as the latitude increases, north and south. No epidemic of yellow fever has been known in North America or South America beyond the forty-fifth degree of latitude. It is therefore evident that the most vigorous sanitary measures must be applied to those localities within the tropics.

Premising that each country shall for itself guaranty that its own cities and ports shall be placed in a state of the highest salubrity, this condition should be periodically officially promulgated by each country, together with such detailed account of its operations as it may be practicable to furnish. Each country should maintain its own maritime inspection stations, at which no fee should be charged. It is also essential that certain international refuge quarantines shall be established

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\* The United States plans, modified from the Holt system, will be placed on exhibition at the rooms of the International American Congress in Washington during its session.

and maintained, as near as practicable to the definite routes of travel, and be completely equipped. To these stations all infected vessels should be obliged to repair before final entry into the country of destination. The certificate of disinfection and cleanliness, of the officer in command of such station should entitle the vessel to enter in free pratique, and all port sanitary authorities should have the right to send any suspected vessel to the nearest international refuge station. The framing of the details for government of these stations might be committed to an international technical commission, or even a single commissioner familiar with the practical details of quarantine management, and, when the regulations shall be framed, then to be submitted to each country separately for adoption.

The support of the international quarantines could be met by annual contributions from each government in interest. No officer connected with the station should be allowed to accept any fee or gratuity as a recompense for services performed at quarantine. The civil code governing the country within the territorial limits of which the particular quarantine is located should govern the officers, employés, and sojourners at the station, and extra-territorial jurisdiction should only be allowed by special treaty. The writer ventures to express the individual opinion that the following refuge stations would, for the present at least, supply the needs of this proposed service:

On the coast of the United States: One at Tortugas Keys, one at the Chan-deleur Islands.

On the coast of Mexico: One near Vera Cruz.

On the Central American coast: One near Colon.

On the Caribbean coast: One near La Guayra.

For the Antilles: One near Port au Prince.

For the Brazilian coast: One at the mouth of the Amazon (near Para).

For Uruguay and the Argentine Confederation: One at the mouth of the Rio de la Plata.

For the Chilian coast: One near Valparaiso.

For the Peruvian coast: One near Callao.

For the United States of Colombia: One near Panama.

For western coast of Mexico: One near Acapulco, one near San Diego, United States of America.

For the western coast of the United States, in addition to the one at San Diego before mentioned: One at San Francisco, one near Port Townsend.

It will be observed that many of these stations will necessarily serve as quarantines of protection for the places in the



vicinity of their location, and where so serving the expenses of such quarantine should be borne by the country of location.

I submit the following as an outline of the basis of an international convention whereby the suggestions embodied in this paper might be carried out if in its wisdom the congress shall elect to consider them:

#### A CONVENTION TO ESTABLISH A SANITARY UNION.

[Here enumerate the powers contracting.]

The undersigned \_\_\_\_\_, of the government of the countries above enumerated, being assembled in congress at Washington, have, by common consent and subject to ratification, adopted the following act:

(1) Each administration transmits at the end of the month of July of each year to each state department or minister of foreign affairs a detailed statement of the public hygienic work performed during the year terminated at the end of the month of June last preceding, and shall also transmit a statement of the expense of each international quarantine within its territorial limits, with a statement of the amounts due from each of the contracting parties to this convention, and each administration shall exercise vigilance to prevent the export of any goods, merchandise, passengers, or vessels infected with any contagious disease.

(2) From and after the ratification of these articles no quarantine fees shall be charged for any vessel coming from any port of any country embraced in this sanitary union, except for the board of persons detained in quarantine, which shall be fixed by each country at a rate as near as may be at the actual cost of such board.

(3) There shall be established at such points as may be agreed upon hereafter international quarantine stations, to which any port authority next nearest any said station may send infected ships for treatment, together with the officers, crew, and passengers thereon, if in the judgment of said port authority it is necessary to secure the salubrity of said port. For the establishment of said international quarantine stations each contracting party to this convention shall designate one delegate, and the delegates when assembled shall as soon thereafter as practicable proceed to designate sites for the said quarantines, which shall be as near the usual ocean routes of travel as practicable consistent with safety to the adjacent coast. The cost of maintenance of said quarantines shall, except as hereinafter provided, be borne by the respective Governments interested in a pro rata share, according to amount of tonnage of each engaged on the route of travel nearest such quarantine, and where any such quarantine shall in addition perform the functions of local quarantine, then the cost of its maintenance shall be borne by the country within whose territorial limits it is located.

(4) The certificate of the officer in command of an international quarantine, that a vessel has been properly disinfected, and that the sanitary condition of the passengers, crew and cargo is good, shall entitle the said vessel to free pratique by all municipal inspection authorities.

(5) The delegates empowered by these articles to designate the sites for

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international quarantines, shall also determine the regulations concerning disinfection, and the penalties to be paid for violation of the regulations.

(6) The criminal and civil code of the country within the territorial limits of which the quarantine is located shall govern the conduct of all persons employed at the quarantines and all sojourners thereat.

(7) All fines and receipts for board of persons detained shall be applied to the support of the quarantine where collected.

The foregoing draught is submitted with diffidence as an outline of the general direction the articles should assume if practical benefits are to follow, and it is believed that if adopted by the Americas, the foreign Governments owning provinces on this hemisphere would in a short time, from the necessities of commerce, join the sanitary union.

I am, sir, very respectfully, your obedient servant,

JOHN B. HAMILTON.

Hon. JAMES G. BLAINE,

*Secretary of State.*

## THE RECONCILIATION OF OUR COMMERCIAL AND SANITARY INTERESTS.

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By GEORGE M. STERNBERG, M. D., *Major and Surgeon, U. S. Army;*

Fellow by Courtesy in Johns Hopkins University; ex-President (1887) of the American Public Health Association; Delegate from the United States to the International Sanitary Conference of Rome (1885); Member of the Havana Yellow Fever Commission of the National Board of Health (1879); Honorary Member of the Epidemiological Society of London; Honorary Member of the Royal Academy of Medicine of Rome; Honorary Member of the Imperial Academy of Medicine of Rio de Janeiro, etc.

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The mutual advantages which the United States and the countries of South and Central America would derive from more intimate and extended commercial relations are generally recognized, and the best means of promoting this object will no doubt be fully discussed by the members of the International American Congress assembled in Washington, by invitation of the United States Government.

It is not the intention of the author of the present paper to consider this subject in a general way, but it has seemed to him that the occasion is a favorable one for calling attention to one of the factors which has interfered with the development of our commerce with these countries in the past, and to inquire whether it is not possible to reconcile our commercial and sanitary interests in the future.

It will be admitted by all that the sanitary interests of the United States call for the exclusion, by proper restrictive measures, of all exotic, pestilential diseases; and it can be shown that even from an economic point of view, a single wide-spread epidemic of yellow fever or cholera costs more than our commerce with permanently infected ports is worth. This is illustrated by our last great yellow-fever epidemic—in 1878—which resulted from the introduction of yellow fever into New Orleans by the steam-ship *Emily B. Souder*, which, according to Dr. Chopin, then president of the Louisiana State board of health,



arrived from Havana May 23, and was moored at the foot of Calliope street. Dr. Chopin says:

The first cases of yellow fever in New Orleans in 1878 were undoubtedly two of the officers of the above steam-ship, namely, Clarke, the purser, and Elliott, one of the engineers.

Infected centers were developed in the vicinity of the houses in which these men were sick, but not until after an interval of several weeks, during which, probably owing to unfavorable conditions as to temperature, the "germs" remained dormant, or at least multiplied so slowly as not to cause an outbreak of the disease. The epidemic which followed invaded one hundred and fifty-two towns in the State of Louisiana, Tennessee, Alabama, Mississippi, Kentucky, Ohio, Illinois, and Missouri, and caused a mortality of nearly 16,000.

The cost of this epidemic has been estimated as follows by the "board of experts" appointed by Congress to investigate it:

*Fifth question.*—The number of deaths that has occurred in the United States during the present year; the expenditure and the injury to business resulting therefrom.

It is respectfully submitted that a full and satisfactory answer to this important question would require much more time for the collection of the many facts indispensable to a trustworthy solution that has been given, and that some of these facts are not yet obtainable.

It has therefore been deemed advisable to submit no more for your consideration than—

First. Approximate and minimum estimates of such expenses as immediately involve some knowledge of medical facts, accompanying these estimates with the data upon which they have been based.

Second. Reference, without estimates, to those causes of expense and loss which require researches not within our time and power to prosecute.

Health is the capital of all who work, and any loss of health impairs that capital. An epidemic entails on a community loss of property as tangible as the results of a fire. The average man may be considered a machine, and as such has a producing power of a certain value, and anything that interferes with his production affects the public weal in dollars and cents. When he dies a given amount of wealth is stricken from the community, and when he falls sick the public loses another sum from the necessary attendance on him by nurses, as well as from his own loss of labor.

It has been estimated by careful statisticians that a child ten years old is worth to the community \$500, and that an adult is worth \$1,000. In calculating the loss to the country by death during the recent epidemic, it has been impossible to find out exactly the proportion of minors to the whole number of the decedents, and in this report the board have endeavored to divide them according to the best information within their reach. This proportion has varied greatly in different places. In New Orleans, for instance, the relative number of children taken with yellow fever was

much larger than in Memphis, which was due, doubtless, to the fact that in the former city the adults were more thoroughly protected against the disease by a previous attack.

In estimating the injury to the material interests of the country resulting from the epidemic, it should be borne in mind that some of it may be more apparent than real. It consists of the diversion of trade rather than the destruction of it. New channels of business are opened, and traffic changes only its course.

The figures on which the following estimates were based are largely conjectural. They have been collected, however, from sources entitled to credit, and have been strictly scrutinized.

It is proposed to consider—

#### (1) THE ACTUAL DIMINUTION OF NATIONAL WEALTH.

At least 18,000 (and probably as many as 20,000) deaths from yellow fever have occurred during the late epidemic. Of this number some three-fifths were minors, and two-fifths were adults, representing a loss of \$12,600,000 according to the basis of valuation already mentioned. It is believed that at least 120,000 cases of sickness from yellow fever took place during the same period.

The loss of time of these patients was a public loss, and should be considered in any computation on the subject. The average duration of their illness and convalescence is not far from twenty-five days, and the value of their time may be put at 50 cents a day. This item would amount to \$1,500,000. To this sum should be added the value of the labor diverted from production or useful activity by attendance upon 120,000 sick persons, for ten days each, at 50 cents per day, \$600,000.

Not less than one hundred and fifty thousand persons fled from their homes and passed their time elsewhere in idleness. Their average absence would not be less than three months, and if their time is reckoned at 50 cents a day, this item would give \$6,750,000. Another element in the point of inquiry is the loss of capital invested in lands, houses, railroads, ocean and river craft, machinery, vehicles, implements, commodities, etc., which were unused on account of the epidemic; but owing to obvious difficulties no estimate is made for the loss from these sources. The same statement also applies to the loss by decay resulting from the want of repairs and means to preserve constructions of all kinds.

A certain portion of the cotton crop and other products of the soil were lost for want of their proper cultivation and gathering. This occurred on plantations where it was impossible to hire labor. This loss is very large, amounting to millions of dollars, but it can not be correctly estimated.

It is probable that no one item of loss equals that due to the depreciation in value of real estate. However, since this depreciation is temporary, it is believed that the actual present loss by this cause would be represented, not by the amount of this depreciation, but by the interest for a limited number of years on said amount. We have not the facts requisite for such an estimate.

It will be seen that we are not able to estimate correctly the total losses to this country, but these losses have been variously estimated by others at sums ranging from one hundred millions to two hundred millions of dollars.

## (2) EXPENDITURES.

It is understood that the point of inquiry made by the committees of Congress in regard to the expenditure of money embraces the following items, although they are in part covered by the foregoing statements:

Cost of sickness of 120,000 persons for twenty-five days, at 50 cents per day .....	\$1,500,000
Cost of medical attendance, nursing the sick, etc.....	3,600,000
Cost of 18,000 funerals, at \$20 each.....	360,000
Cost of special sanitary work.....	100,000

Total.....	5,560,000
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For such expenditures about \$2,000,000 were charitably contributed.

## (3) DISTURBANCE TO BUSINESS.

Another item of loss which can not be given even by approximation is that from the disturbance of the ordinary conditions upon which business calculations are based. It enters into many questions, among them that of life insurance, and requires in this place only a mention.

## (4) LOSSES TO NEW ORLEANS.

The following special estimate of the losses that have accrued to the great commercial city of New Orleans includes some items not considered by figures in the first class, such as loss on capital and depreciation of property, the total losses having been variously estimated by others at from twelve to one hundred millions of dollars.

Cost of sickness of 27,000 persons, including attendance, nursing the sick, etc .....	\$1,200,000
Cost of 4,600 funerals at \$25.....	115,000
Four thousand six hundred victims represent a capital value of .....	3,220,000
Loss of time of half the industrial population, say 20,000, for ninety days, at \$1 per day.....	1,800,000
Loss of the profits on the expenditures abroad of about 20,000 refugees, at \$50 each.....	1,000,000
Losses in rents and of the interest on the capital represented by the depreciation of real estate.....	4,000,000
Local commercial losses by interruption of business and diversion of trade, etc.....	*5,000,000

Total.....	15,335,000
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JOHN M. WOODWORTH, M. D., *President.*

STANFORD E. CHAILLE, M. D., *Secretary.*

S. M. BEMISS, M. D.

JEROME COCHRAN, M. D.

M. S. KRAFT, M. D.

SAM'L A. GREEN, M. D.

THOMAS S. HARDEE, C. E.

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JACOB S. MOSHER, M. D.

W. H. RANDLE, M. D.

LOUIS A. FALLIGANT, M. D.

R. M. SWEARINGTON, M. D.

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\* Estimated by competent authority as high as \$10,000,000.



These figures will suffice to show that this question of the exclusion of exotic epidemic diseases demands the attention of political economists as well as of sanitarians; and commerce can not ignore it, inasmuch as public sentiment demands the protection which can only be obtained by a proper sanitary supervision of ships coming to our ports from infected localities.

Fortunately for us the epidemic habitant of Asiatic cholera is so remote that we have comparatively little to fear from this scourge of mankind; especially as the countries which it must traverse before reaching our shores serve as outposts to give us warning of the approaching danger. It is very different as regards yellow fever, which has its permanent abode at our very doors, in some of the countries with which we are seeking more extended commercial relations.

No doubt the question will be raised as to whether yellow fever is really an exotic which only appears in the United States as a result of the importation of cases or infected articles from some exterior focus of infection. In some of the countries where it prevails its transportability in this way is denied, and it is generally believed to be due to local or climatic conditions alone. There is also a very general belief in some of these countries that the disease prevails annually on our own Gulf coast, and that it is folly to attempt to exclude a disease by quarantine restrictions which depends upon climatic conditions, and which belongs to our own shores as well as to theirs.

This, also, was formerly the opinion of many physicians in our own country and of a considerable proportion of those engaged in commerce in our southern sea-ports. Looking upon the disease as something independent of human intercourse, and depending upon climatic conditions beyond the control of man, quarantine restrictions were vigorously opposed by many, upon the ground that they were a useless task upon commerce. But the experience of the past thirty years has convinced all those who are well informed as to the facts, that such is not the case. There was a time when the opinion referred to seemed justified by the almost annual occurrence of epidemics in some of our southern sea-port cities, and notably in New Orleans, as is shown by the following table. But we believe now, in the light of more recent experience, that this annual prevalence was due to inefficient quarantine restrictions, and

to annual, or at least frequent, importations from the permanently infected ports further south, and outside of our borders:

*Mortality from yellow fever in the city of New Orleans during the present century.*

Year.	Deaths.	Year.	Deaths.	Year.	Deaths.	Year.	Deaths.
1800*		1821		1842	211	1863	
1801*		1822	239	1843	487	1864	
1802*		1823	1	1844	148	1865	
1803		1824	108	1845	2	1866	
1804*		1825	49	1846	160	1867	3, 093
1805		1826	5	1847	2, 259	1868	
1806		1827	109	1848	850	1869	
1807		1828	130	1849	737	1870	587
1808		1829	215	1850	102	1871	55
1809*		1830	117	1851	16	1872	40
1810		1831	2	1852	415	1873	225
1811*		1832	18	1853	7, 970	1874	
1812*		1833	210	1854	2, 423	1875	
1813		1834	95	1855	2, 670	1876	
1814		1835	284	1856	74	1877	
1815		1836	5	1857	199	1878	600
1816		1837	442	1858	3, 889	1879	
1817	800	1838	17	1859		1880	
1818	115	1839	452	1860			
1819	2, 190	1840	3	1861			
1820*		1841	594	1862			

\* Number of deaths not stated.

Reference to this table shows that in the city of New Orleans yellow fever prevailed to some extent annually from 1822 to 1858; and it was during this period that the inhabitants of the city generally maintained that the disease was endemic, and that those engaged in commerce strenuously opposed quarantine restrictions on this ground. The residents of the city were at that time to a large extent "acclimated" to the yellow-fever poison by frequent exposure to its action or by an attack of the disease; and, as in Havana, it was claimed that native-born "creoles" had an hereditary immunity from the disease. As in Havana and in Rio de Janeiro it was essentially a disease of strangers; and while the native population attended to their business affairs as usual during the epidemic season, the mortality among "unacclimated" strangers was considerable.

At the present time, on the contrary, it is generally conceded that the disease does not appear in that city except as a result of importation, and public sentiment is almost unanimous in demanding a careful supervision by the health authorities of all vessels sailing from yellow-fever infected ports. This change of opinion has been brought about by the history of the disease in New Orleans since the date last mentioned, 1858. During the civil war, when commerce was very much restricted,



and quarantine regulations of the most stringent kind were enforced by the military authorities, no epidemic occurred, although the city was occupied by a considerable number of unacclimated Northern soldiers. It was not until the year 1867 that the disease again prevailed, causing a mortality of 3,093. It prevailed extensively during the same year in the State of Texas, and in the city of Galveston alone caused a mortality of 1,150. That it was due to importation is generally admitted, but I am not able to give the precise channel by which it was introduced.

In 1873 yellow fever was again imported to New Orleans by the Spanish bark *Valparaiso*, which sailed from Havana, June 15, in ballast, and arrived at the New Orleans quarantine station June 24, where she was detained two days, coming to the city June 26. The first case was the mate of this vessel, who was taken sick on board July 4, while she was lying at the wharf. But for the sickness and death of the mate of the *Valparaiso*, the origin of this epidemic would have remained obscure, and the believers in the local origin of the disease would have had a strong case, for no other cases of the disease occurred on the *Valparaiso*. This is explained by the fact that the crew consisted of acclimated Spaniards, and the mate seems to have been the only susceptible person on board who could serve as a test of the infection of the vessel at her port of departure. From New Orleans the disease was carried to Memphis by the river steamer *Bee*. It caused a mortality in this city of 2,000. River steamers from New Orleans also carried the disease to Shreveport, La., where the mortality was 759. From Shreveport, La., a refugee fled to the town of Calvert, Tex., where he was taken sick and died; an epidemic followed with a total mortality of 125. The disease was also introduced by refugees to the town of Marshall, Tex., where 36 deaths occurred. The epidemic of this year at Pensacola, Fla., was due to an independent importation, by the ship *Golden Dream*, and Montgomery, Ala., became infected through refugees from Pensacola.

From 1873 until the present date there has been but one epidemic of yellow fever in New Orleans—that of 1878, already referred to, when it was introduced from Havana by the steamship *Emily B. Souder*. We are therefore justified in asserting that the disease is not endemic in that city. The evidence is still more favorable to this conclusion in Galveston, Pensacola,

Mobile, St. Augustine, Jacksonville, Savannah, and Charleston, in all of which cities epidemics have occurred as the result of importation. The sanitary officials of this country are therefore thoroughly convinced that our safety from epidemics of the disease in question depends upon a strict sanitary supervision of all vessels arriving from infected ports, and the enforcement of proper quarantine regulations.

The necessity for such restrictions being recognized, the question of how the desired result may be attained with the least possible delay to ships and tax upon commerce becomes one of prime importance to those engaged in commercial pursuits and to the country generally.

Before considering this question, I desire to present some additional facts with reference to the history of the disease under consideration.

[Extracts from a paper contributed by the writer to "Wood's Reference Handbook of the Medical Sciences," Volume VIII.]

#### HISTORY AND GEOGRAPHICAL DISTRIBUTION.

The geographical range of yellow fever is more restricted than that of any other acute infectious disease, and within the area of its prevalence it is essentially a disease of the littoral, and especially of seaport cities. While occasional epidemics have occurred upon the southwest coast of the Iberian peninsula, the disease, as an epidemic, is unknown elsewhere in Europe, and there is no evidence that it has ever invaded the great and populous continent of Asia. In Africa it is limited to the west coast. In North America, although it has occasionally prevailed as an epidemic in every one of our sea-port cities as far north as Boston, and in the Mississippi Valley as far north as St. Louis, it has never established itself as an endemic disease within the limits of the United States. Vera Cruz, and probably other points on the Gulf coast of Mexico, are, however, at the present time endemic foci of the disease. In South America it has prevailed as an epidemic at all of the sea-ports on the Gulf and Atlantic coasts, as far south as Montevideo and Buenos Ayres and on the Pacific along the coast of Peru.

The region in which the disease has had the greatest and most frequent prevalence is bounded by the shores of the Gulf of Mexico, and includes the West India Islands. Within the past few years yellow fever has been carried to the west coast of North America, and has prevailed as an epidemic as far north as the Mexican port of Guaymas, on the Gulf of California.

The idea that yellow fever may originate *de novo*, within the area of its occasional prevalence, was entertained by many medical authors during the first half of the present century, and is still held by a few. Thus Cornillac (1886) says: "In the zone which is habitual to it, yellow fever may develop at a given moment without apparent cause. It is born spontaneously at a point of this zone, or at several at a time, and neither the tem-

perature, moisture, barometric pressure, electricity, or final effluvia given off from the soil, can explain this sudden invasion." It is true that, in localities where the disease is endemic, cases occur which are not directly traceable to importation, but it is also true that in the principal endemic foci of the disease, such as Vera Cruz, Havana, and Rio Janeiro yellow fever was at one time unknown and we have reliable historic data fixing the date of its importation. In short, a careful consideration of the historical evidence relating to the disease gives no support to the idea of independent local origin, any more than in the case of small-pox, cholera, or other specific infectious diseases.

But the early history of the disease is involved in obscurity, and we are at present unable to determine whether, as maintained by some, it was endemic at certain points on the shores of the Gulf of Mexico at the time of the discovery of the "new world," or whether it was imported to the West Indies from the African coast, as maintained by others. The early historians, Herrera, Oviedo, Rochefort, and others, make reference to epidemics among the natives which occurred prior to the discovery of the Antilles, and to fatal pestilential diseases among the first settlers of these islands; but their accounts are not sufficiently exact to enable us to affirm that the disease referred to by them was yellow fever.

The west coast of Africa was discovered and colonized to some extent before the discovery of America, but the first authentic accounts of the prevalence of yellow fever on this coast date back only to the year 1778, over two centuries after the first settlements had been established. On the other hand, this very epidemic of 1778, at St. Louis (Senegal) was traced to importation from Sierra Leone, a portion of the African coast which, according to Hirsch, "appears to be the headquarters of the disease, and the starting-point of its epidemic inroad into the territories lying to the north and south, as well as into the west African islands."

Rochefort, whose "*Histoire naturelle et morale des isles Antilles de l'Amerique*," was published in Holland in 1558, says of the West Indies: "The air of all those islands is very temperate and healthy when one is accustomed to it. The peste was formerly unknown there, as well as in China and other places in the Orient, but some years since the islands were afflicted with malignant fevers, which the physicians considered contagious. The bad air was brought there by some ships which came from the coast of Africa, but at present we hear nothing more of these maladies."

It seems very probable that a pestilential malady which prevailed for a time in these usually healthy islands and then disappeared was in fact yellow fever, and that it was introduced by ships from the west coast of Africa is not at all incredible. Indeed, it almost seems necessary to look for an original endemic focus of the disease outside of the West Indies, for the reason that, in the comparatively few places where it is now endemic there is historical evidence to show that there was a first importation and a previous period of exemption; while, on the other hand, the conditions upon which endemicity at the present day seems mainly to depend were formerly unknown—conditions arising from the aggregation of population at seaport cities, as at Havana, Vera Cruz, and Rio Janeiro,

Some authors have attempted to identify the epidemic disease mentioned by Humboldt—called by the natives "*Matlazahuatl*"—which prevailed in



Mexico in 1545, 1576, 1736-'37, and 1761-'62, with yellow fever; but, as pointed out by Hirsch, this disease prevailed almost exclusively among the natives of the interior and of the table-land of Mexico, while yellow fever is essentially a disease of the littoral.

Cornillac, a recent French author who has made a careful study of the sanitary history of the West Indies, as contained in the works of Oviedo, Herrera, Gomara, and other Spanish authors of the sixteenth century, arrives at the conclusion that the pestilential disease from which the settlers in the first Spanish colony at Nueva-Isabella, and at Santo Domingo (1494-1514), are said to have suffered, and which was characterized by a "saffron-yellow" color of the skin, was in truth yellow fever. While it appears quite probable that this was so, we can not accept it as demonstrated, as the first authentic accounts of yellow fever in the West Indies date from about the middle of the following century.

In 1635 a French colony was established upon the island of Guadeloupe, and shortly after their arrival a pestilential disease appeared among the colonists, which, from the account given by Dutertre, a Catholic priest who came to the island five years later, is accepted by Hirsch and Cornillac as having been yellow fever. From Dutertre's account, however, as quoted by Cornillac, it would appear that yellow fever was first imported into the island of Guadeloupe in the year 1648, and that the great mortality previously reported was due to other causes. Dutertre says: "During this same year, 1648, the peste, until then unknown in these islands since they were inhabited by the French, was brought there by some vessels. It commenced at Saint Christophe, and during the eighteen months that it lasted carried away nearly one-third of the inhabitants. This epidemic peste caused in those who were attacked a violent *mal de tête*, great debility in all the members, and continual vomiting, so that in three days it put a man in his tomb. This contagious malady was brought to Guadeloupe by a ship from La Rochelle, called *Le Beuf*."

At Barbadoes the disease may have prevailed for some years prior to its introduction to Guadeloupe, but the first authentic account relates to the year 1647. Richard Ligon, who arrived at the island in the month of September of this year, says that the city of Barbadoes was at that time suffering from a scourge which caused great ravages, so that the living scarcely sufficed to bury the dead. According to this author, the cause of the epidemic was unknown; it was uncertain whether it had been imported, or whether it originated from bad food, the use of marsh water, and the intemperance of the colonists. Ligon inclines to attribute it largely to the latter cause, and remarks that not more than one woman died for every ten men. We may safely assume, from the subsequent history of the island of Barbadoes, that the epidemic plague referred to by Ligon was not of local origin, for, with a rapidly increasing population this island has enjoyed considerable periods of immunity from yellow fever, and when epidemics have occurred they have, as a rule, been clearly traced to importation. From this time (1647-'48) the history of yellow fever in the West Indies is a history of epidemic outbreaks at varying intervals, at the principal sea-port towns, traced sometimes to importation, but more commonly assumed to be of local origin. It was epidemic in Jamaica in 1655, and again in 1671; at Santo Domingo in 1656; at Martinique in 1688 and 1696. In 1699 it prevailed

widely as an epidemic in the West Indies, and, according to Hinemann, made its first appearance at Vera Cruz, the principal sea-port on the Gulf coast of Mexico.

*Cuba.*—I can not attempt to follow here the history of yellow fever in the West Indies generally, but shall give an account of its prevalence in Havana, as this is now an endemic focus of the disease and the point which is the most dangerous to the United States, on account of its proximity and the constant commercial intercourse between this city and our own sea-ports.

The historian Pezuela records the prevalence of a malignant pestilential disease in Havana in 1648, a year in which, as we have seen, yellow fever was epidemic in the islands of Guadeloupe and of Barbadoes. He says: "In this year there occurred in Havana a great pest of putrid fevers which remained in the port almost all the summer. A large part of the garrison and a larger part of the crew and passengers in the vessels died." The epidemic continued the following year, and in 1653-54, according to the author above quoted, "the epidemic was renewed with equal fury;" and in 1655 "in the capital continued to carry away its victims without regard to rivalries and passions." According to Dr. S. E. Chaille, President of the Havana Yellow Fever Commission (1879), from whose report we have quoted the above extracts from Pezuela, there is no historical evidence of the prevalence of yellow fever in Havana for more than a hundred years after the date mentioned. "On the contrary, there are repeated records of the great salubrity of the climate and the absence of epidemic diseases."

It was not until the year 1761 that yellow fever established itself in the previously healthy city. Pezuela gives the following account of its introduction:

"Although Havana is situated on the northern boundary of the torrid zone, it was very justly considered one of the most healthy localities on the island before its invasion, in a permanent manner, by the vomito negro, imported from Vera Cruz in the summer of 1761. \* \* \* In May there came from Vera Cruz, with materials and some prisoners destined for the works on the exterior fortifications of Havana, the men-of-war *Reina* and *America*, which communicated to the neighborhood the epidemic known by the name of 'vomito negro.' At the end of the following June there were stationed in this port nine men-of-war, dispatched from Cadiz, and sent to the chief of the squadron, Don Entienne de Hevia; they brought a re-enforcement of 2,000 men. More than 3,000 persons succumbed to the epidemic on this, *the first appearance of the vomito.*"

From this time to the present day the new levies of troops sent from Spain to Cuba have continued to suffer enormous losses from the endemic pestilence. In 1779 there arrived from Spain, then at war with Great Britain, "an army of 3,500 men, which was immediately decimated by the vomito." In 1780, during the month of August, an army of 8,000 men was landed in Havana, which, during the two following months, suffered a loss of about 2,000 men with the vomito. Pezuela records the fact that in 1794, in the garrison and squadron, there were more than 1,600 victims to the disease.

The endemicity of yellow fever in Havana was fully established by the researches of the commission sent to that city in 1879, by the National Board of Health. Dr. Chaille, president of this commission, says in his

elaborate report published in 1881: "Since 1761 yellow fever has prevailed, certainly in Havana, and probably in other places in Cuba, every year, and the dates of prevalence recorded in our text-books indicate no more than the years of greatest prevalence. The disease prevails in Havana, and in some other places in Cuba, not only every year, but also every month in the year; records in 1837 indicate that at that date the monthly prevalence had become habitual in Havana. The statistics, solely of the military and civil hospitals, prove that during the 408 months, 1856-'79, there was only one single month free from an officially recorded case of yellow fever.

The following tables are from the "Preliminary Report of the Havana Yellow Fever Commission:"

*Monthly maximum and minimum deaths by yellow fever in Havana during the ten years 1870-'79.*

Months.	Mini- mum.	Maxi- mum.	Months.	Mini- mum.	Maxi- mum.
January .....	6	32	July .....	68	675
February .....	4	24	August .....	70	416
March .....	4	32	September .....	35	234
April .....	4	37	October .....	28	185
May .....	13	103	November .....	5	150
June .....	66	378	December .....	9	82

In no one of the ten years, 1870-'79, has there ever been fewer deaths than in the first, nor more than in the second column, and the total deaths by yellow fever for each year were as follows:

*Total deaths by yellow fever in Havana.*

Years.	Deaths.	Years.	Deaths.
1870 .....	665	1875 .....	1,001
1871 .....	991	1876 .....	1,619
1872 .....	515	1877 .....	1,374
1873 .....	1,244	1878 .....	1,559
1874 .....	1,425	1879 (to October 1) .....	1,353

"Matanzas has the reputation of having long suffered annually with yellow fever; the earliest positive date secured by me was reported by Dr. Guiteras, a member of the commission, a native of Matanzas, who was assured by one of the oldest physicians that the city suffered with the disease in 1828, when he came to Matanzas, and had prevailed every year since." (Chaille, op. Cit.)

*Cienfuegos.*—Yellow fever every year since 1850, except in 1862 and 1874.

*Santiago de Cuba.*—Yellow fever prevailed every year and nearly every month from 1850 to the present time.

*Manzanillo.*—Yellow fever every year since 1866.

*Vera Cruz.*—The principal seaport on the Gulf coast of Mexico is also the principal endemic focus of yellow fever upon this coast. According to Hine-mann, the first epidemic occurred in 1699, a year in which yellow fever was widely prevalent in the West Indies, and in which it prevailed for the first time as an epidemic in the city of Philadelphia.



The following table, which I copy from a paper by Dr. Zacarias R. Molina, a medical officer of the Mexican Army who has for a number of years been on duty in the Military Hospital at Vera Cruz, shows the continued prevalence of the disease in that city during a period of nearly fifteen years.

*Mortality from yellow fever in the city of Vera Cruz, from July, 1867, to December, 1881.*

Month.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.
Jan .....					3	2	1	1	7			16	6	2	28
Feb .....		6				2		2	2	1		5	4		22
Mar .....		7			1	4			4	1	1		2	1	29
April .....		31	2		6	5	3		11			7	1	1	29
May .....		42			19	14	1	2	29		4	7	1		94
June .....		16			113	45	19	3	93	2	7	58	1		233
July .....		28	1		71	53	59	11	118	4	54	114	2	1	132
Aug .....	29	21	1		17	39	59	24	105	7	144	110	1	3	39
Sept .....	36	21			10	29	74	7	41	9	164	62	3	9	22
Oct .....	17	9	1	3	15	11	20	12	13	6	77	45			42
Nov .....	11	2	2	5	2		10	11	2	1	50	24			92
Dec .....	8	3		2	4	6	7	6		3	27	7		98	4
Total.	109	193	7	10	271	210	223	79	475	34	528	444	21	249	675

There is no evidence of continued prevalence at other towns upon the Mexican coast, but epidemics which have usually been traced to importation from Vera Cruz, have occurred at *Matamoras* (1858, 1863, 1867); at *Tampico* (1821, 1836, 1845, 1847, 1853, 1864); at *Tuxpan* (1863, 1875, 1877); at *Campeche* (1865, 1877), and at *Manzanillo* (1868).

The Gulf coast of South America, and especially the English and French settlements in Guiana, have been frequently visited by epidemics of yellow fever, and it is probable that the disease is endemic at one or more points upon this coast. Its epidemic prevalence is recorded for the following years at *Demerara*: 1793-'96, 1800, 1803, 1818, 1819, 1820, 1821, 1825, 1827, 1828, 1831, 1837-'39, 1841-'45, 1851-'53, 1861-'66 (Hirsch).

In Venezuela the disease has prevailed at the capital, *Caracas*, and the neighboring sea-port *La Guayra*, in the years 1693, 1696, 1793, 1797, 1802, and 1869.

In Central America epidemics have occurred at all of the principal sea-ports: *Panama*, 1740, 1858, 1867; *Porto Bello*, 1726, 1729, 1740, 1793, 1860, 1866, 1867; *Belize*, 1860; *Nicaragua*, 1863.

*Brazil*.—The Portuguese author, El Hastio da Rocha Pitti, has given an account in his History of Portuguese America, published in Lisbon in the year 1730, of an epidemic malady which prevailed in Pernambuco in the year 1686, which very probably was yellow fever. This author says (Book VII, page 427, *et seq.*):

"In the year 1686 commenced in Pernambuco that terrible plague (contagious disease, *Bicha*) which must be attributed to the sins of the population of these provinces, corrupted by the vices into which they were enticed by the wealth and freedom of Brazil. Many causes are alleged, the most worthy of attention being the arrival of some barrels of meat which returned from the island of São Thome (St. Thomas). These were opened by a cooper, who shortly afterward fell dead. Soon after several persons of his family, to whom he had communicated the disease also died. The epidemic spread

to such an extent among the inhabitants of Recife (Pernambuco) that the mortality exceeded 2,000, which was very large in proportion to the population. Thence the disease extended to Olinda and its vicinity, and very few were the persons who escaped it, such were its virulence and intensity."

The account given by the historian of the clinical features of this pestilential disease is, of course, very imperfect, but it seems to justify the belief that the disease was really yellow fever.

The highest medical authorities in Brazil agree that yellow fever was not endemic in the principal sea-ports of the Empire prior to the year 1849, when it was introduced to the city of Bahia by the North American brig *Brazil*, which sailed from New Orleans, where yellow fever was prevailing, and touched at Havana. Two of the crew of this brig died of yellow fever during her voyage from the latter port to Bahia. Soon after her arrival the disease made its appearance among those who had communicated with the ship, and later on other vessels in the harbor. The first case occurred a few days after the arrival of this brig (November 3). A part of her cargo is said to have consisted of little barrels of beef which had become putrid. From Bahia the disease was carried to Rio Janeiro, where, during the epidemic season of 1850, it caused a mortality of 4,160.

According to Professor Barata, of the Faculty of Medicine of Rio Janeiro, yellow fever continued to prevail in Brazil until the year 1861, when it disappeared for eight years, to re-appear in 1869-'70, as the result of a fresh importation. The Italian ship *Creolla del Plata*, which had touched at St. Iago, where yellow fever was prevailing, is named as the vessel which introduced the disease on this occasion.

The mortality from the disease under consideration in the city of Rio from the time of its introduction, in 1850, to a recent date, is shown by the following table:

Years.	Mortality.	Years.	Mortality.
1850 .....	4,160	1869 .....	274
1851 .....	475	1870 .....	1,117
1852 .....	1,943	1871 .....	8
1853 .....	853	1872 .....	102
1854 .....	21	1873 .....	3,659
1855 .....	.....	1874 .....	829
1856 .....	.....	1875 .....	1,292
1857 .....	1,425	1876 .....	3,317
1858 .....	800	1877 .....	282
1859 .....	500	1878 .....	1,174
1860 .....	1,249	1879 .....	974
1861 .....	247	1880 .....	1,433
1862 .....	12	1881 .....	219
1863 .....	.....	1882 .....	55
1864 .....	.....	1883 .....	1,336
1865 .....	.....	1884 .....	618
1866 .....	.....	1885 .....	278
1867 .....	.....	1886 .....	1,397
1868 .....	.....	1887 .....	.....

In 1855 yellow fever is said, by Hirsch, to have prevailed extensively in Brazil, although this was not an epidemic year in Rio Janeiro. The following year it extended along the Amazon far into the interior of the country. The years of greatest epidemic prevalence since that date have been 1859-'60, 1862, 1869-'70, 1872-'73, 1875-'77 (Hirsch).

From Brazilian ports the disease has occasionally been introduced to the cities at the mouth of the Rio de la Plata and has there caused great loss of life. The first epidemic at Montevideo was in 1857, and it was again introduced into this city from Pernambuco, in 1872. It prevailed in the city of Buenos Ayres in 1858 and in 1870.

Yellow fever is said to have been conveyed to the Pacific coast of South America by a party of German emigrants, who landed at Callao, Peru, in 1854. The disease spread from this port to the capital, and in the course of the next two or three years to the principal towns upon the Peruvian coast, where it continued to prevail up to the year 1869.

*Chili*, up to the present time, has remained exempt from the disease (Hirsch).

Upon the *West Coast of Africa* the headquarters of yellow fever is that portion of the coast which belongs to the province of *Sierra Leone*, and epidemics at other points upon the African coast have frequently been traced to this locality. It seems very doubtful, however, whether, as some authors suppose, this is really the original source of the disease. The French authors Berenger-Feraud and Bourru both call attention to the fact that we have no account of the disease prior to the year 1778, although the African coast was discovered and colonized long before the discovery of the West Indies; and that, on the other hand, the early settlers in these islands suffered from a pestilential malady which very probably was yellow fever.

At *St. Louis* (Senegal) an epidemic occurred in 1778, and this is the first outbreak of the disease of which we have any reliable information in this portion of the world. The disease in this instance is said by Schotte to have been imported from *Sierra Leone*, where epidemics are recorded to have occurred during the present century in 1816, 1823, 1825, 1829-'30, 1837-'39, 1845-'47, 1859, 1862, 1864, 1865-'66, 1868, 1878 (?) (Hirsch). Frequent epidemics have also occurred at *Senegambia*, and the disease has prevailed upon the *Gold Coast* (1852, 1857, 1862), the *Congo Coast* (1816, 1860, 1862, 1865), at the *Cape Verde Islands* (1845, 1862, 1863), and the *Canary Islands* (1701, 1771, 1810, 1846, 1862).

In Europe the ravages of yellow fever have been restricted mainly to the Iberian Peninsula. This is due, no doubt, to the frequent intercourse between Spain and Portugal, and the West Indian ports, in which the disease is most prevalent, and to the fact that the summer temperature of these countries is favorable for the epidemic extension of the disease, whereas the more northern portions of Europe are practically outside of the yellow-fever zone.

The first epidemic in *Spain* occurred in the year 1700, at Cadiz. This city also suffered in 1730-'31, 1733-'34, 1764, 1780, 1800, 1804, 1810, 1819-'21. The epidemics of 1800, 1810, and 1819, were not limited to the city of Cadiz, but the disease extended to the interior and caused a considerable loss of life in the provinces of Grenada and Andalusia, and also in some of the towns of Murcia and Catalonia—especially in Barcelona, from which city the disease was conveyed to the island of Majorca during the last epidemic. No widespread epidemic has occurred in Spain since 1821, but local outbreaks, as a result of importation from the West Indies, have occurred in Gibraltar (1828), Barcelona (1870), and Madrid (1878).

The first epidemic at *Lisbon* was in 1723, a second was inaugurated in



1856, and during the following year developed into a devastating scourge, which extended to the towns of Belem, Olivaes, and Almada.

In *Italy*, yellow fever has only once effected a temporary lodgment—at Leghorn, in 1804, where it was imported from Spain.

Ships with yellow fever on board have occasionally arrived at English and French ports, but local conditions have apparently not been favorable to an extension of the disease, except to a limited extent at Brest, in 1856, at St. Nazaire in 1861, and at Swansea (Wales), in 1864.

*Bahama Islands*.—Yellow fever prevailed as an epidemic at Nassau in 1861, 1862, 1863, and in 1869.

According to Hirsch, yellow fever prevailed, to a limited extent, at Halifax (latitude  $41^{\circ} 26'$ ), in 1861, and at Quebec (latitude  $46^{\circ} 50'$ ), in 1805.

#### PREVALENCE OF YELLOW FEVER IN THE UNITED STATES.

*New Hampshire*.—Portsmouth is the most northern point in the United States which has suffered an epidemic of yellow fever. In 1798, and again in 1802, during which year the disease was epidemic in New York and Philadelphia, it was also epidemic in this city.

*Massachusetts*.—In 1693 an English expedition sailed from Boston for the purpose of taking from the French the island of Martinique. The expedition failed in its object and returned to Boston on June 17, with yellow fever on board the vessels of the fleet. Hutchinson, in his "History of Massachusetts Bay," says the mortality among the sailors had been 1,300, out of a total strength of 2,100, and that out of the same number of soldiers the loss was 1,800. He states that the disease spread from the fleet to the town, and that many families left town and resided in the country until the infection had ceased. This is the first authentic account of the occurrence of yellow fever within the present limits of the United States. In 1796 the disease prevailed to a limited extent in Boston and Newburyport. In 1798 it prevailed as an epidemic in Boston, where the mortality was 200, and in 1802 sixty fatal cases occurred in the same city. Some cases also occurred in the years 1800, 1819, and 1858.

*Rhode Island*.—The city of Providence was several times visited by yellow fever during the latter part of the eighteenth and the beginning of the present century—1794, 1795 (mortality 45), 1797 (mortality 45), 1800, 1805. The disease prevailed at Newport in 1798, and at Bristol in 1797.

*Connecticut*.—The disease prevailed at New London in 1795, and again in 1798, when the mortality was 81. Hirsch records the occurrence of the disease at New Haven in 1743, and 1794, and 1805; at Middleton in 1820; at Chatham in 1796, and at Hartford in 1799.

*New York*.—Epidemics of greater or less extent have occurred in New York City and its immediate vicinity in 1693, 1702, 1743 (mortality 217), 1745, 1762, 1791, 1794, 1795 (mortality 730), 1798 (mortality 2,080), 1799 (mortality 76), 1800, 1801, 1803 (mortality 700), 1805 (mortality 340), 1809, 1819, 1822 (mortality 230), 1848, 1853, 1854, 1856, 1870 (mortality 49).

*New Jersey*.—Hirsch records the following local epidemics: Bridgetown, 1798; Chews, 1798; Woodbury, 1798; Perth Amboy, 1811.

*Pennsylvania*.—According to La Roche "the earliest onset of the disease occurred in 1699, when Philadelphia, then but seventeen years of age, was a little more in point of extent than an ordinary country town." There

are no medical accounts of this epidemic, but there is no doubt as to the nature of the disease, which caused a mortality of 220 in the new city, estimated to have contained less than 4,000 inhabitants. The next epidemic in Philadelphia occurred in 1741, when the mortality was 250. Subsequent epidemics occurred in 1747, 1762, 1793 (mortality 4,041), 1794, 1797 (mortality 1,300), 1798 (mortality 3,500), 1799 (mortality 1,000), 1802 (mortality 307), 1803 (mortality 195), 1805 (mortality 400), 1819, 1820 (mortality 83), 1853 (mortality 128), 1870 (mortality 18).

*Delaware.*—In the epidemic of 1798 the city of Wilmington suffered a loss of 250.

*Maryland.*—Epidemics, for the most part of limited extent, have occurred in Baltimore in the years 1783, 1794, 1797, 1798, 1799, 1800, 1802, 1819, 1820, 1821, 1822, 1868, 1876.

*Virginia.*—At Norfolk epidemics are recorded as follows: 1737, 1741, 1794, 1795, 1797, 1799, 1800 (mortality 250), 1801, 1821, 1826, 1855 (mortality 1,807). An epidemic occurred at Petersburg in 1798, and at Alexandria in 1803. At Portsmouth the disease prevailed in 1852, 1854, and 1855 (mortality 1,000).

*North Carolina.*—Wilmington, 1796, 1800, 1821, 1862 (mortality 446); New Berne, 1799, 1864 (mortality 700); Beaufort, 1854, 1864 (mortality 68), 1871; Washington, 1800; Smithville, 1862.

*South Carolina.*—The first epidemic of which we have any account in Charleston occurred in 1683; from this time epidemics have been numerous, and during the first half of the present century the physicians of Charleston generally considered the disease endemic in that city. That it was not seems to be demonstrated by the immunity enjoyed since 1871, an immunity which is probably due to the diminished commerce with infected ports in the West Indies, and to a more efficient quarantine service, since the fact has been recognized that the disease is not endemic.

The prevalence of yellow fever in Charleston during the present century is shown in the following table; recorded epidemics prior to the year 1800 are as follows: 1693, 1699, 1700, 1703, 1728, 1732, 1734, 1739, 1745, 1748, 1753, 1755, 1761, 1762, 1763, 1770, 1792, 1794, 1795, 1796, 1797, 1798, 1799 (mortality 239). An epidemic occurred among the troops stationed at Hilton Head in 1662; Port Royal, 1877 (mortality 25).

*Georgia.*—At Savannah epidemics are recorded in the years 1800, 1807, 1808, 1817, 1819, 1820, 1827, 1852, 1853, 1854 (mortality 580), 1858, 1876; at St. Mary's in 1808 (mortality 84), and in 1854; at Augusta in 1839 and 1854; at Bainbridge in 1873; Brunswick, 1876.

*Florida.*—The principal sea-port, Pensacola, has suffered frequent epidemics of yellow fever. Those occurring during the present century are included in the table given above. Two epidemics are recorded as occurring prior to the year 1800—1764 and 1765. At St. Augustine epidemics occurred in 1807, 1821, 1838, 1839, and 1841; at Key West in 1823, 1829, 1841, 1862, 1867, 1875, 1878, 1887; at Jacksonville in 1857, 1877, and 1888; at Fernandina in 1877 (mortality 498); at Tampa in 1839, 1853, 1871, 1887.

*Alabama.*—The recorded epidemics in Mobile, prior to the year 1800, were in 1705, 1765, and 1766; subsequent epidemics are included in the table. Montgomery, 1853 (mortality 35), 1854 (mortality 45), 1855 (mortality 30), 1873 (mortality 102); Selma, 1853 (mortality 32); Florence, 1878.

*Mississippi*.—The town of Biloxi, on the Gulf, has suffered from epidemics as follows: 1702, 1839, 1847, 1853, 1858, 1878, 1884; Pascagoula, 1847, 1853, 1875, 1878; Port Gibson, 1878; Shieldsborough, 1820, 1829, 1839; Port Adams, 1839, 1853; Grand Gulf, 1853; Natchez, on the Mississippi River, 1817, 1819 (mortality 180), 1823 (mortality 312), 1825 (mortality 150), 1827, 1829 (mortality 90), 1837 (mortality 280), 1839 (mortality 235), 1848, 1853, 1855, 1858; Vicksburgh, 1839, 1841, 1847, 1853, 1855, 1858, 1871, 1873, 1878 (mortality 872); Jackson, 1853, 1854, 1878 (mortality 86); Holly Springs, 1878 (mortality 309); Greenville, 1878 (mortality 301); Grenada, 1878 (mortality 326); Canton, 1878 (mortality 180). Our record does not include numerous smaller places which suffered during the epidemic of 1878.

*Louisiana*.—The first recorded epidemic in New Orleans was in the year 1769; other outbreaks prior to the present century were in 1791, 1793, 1794, 1795, 1796, 1797, 1799. The prevalence of the disease in this city subsequent to the year 1800 is given in the table, Baton Rouge, 1817, 1819, 1822, 1827, 1829, 1837, 1843, 1847, 1853, 1858, 1878 (mortality 193); Opelousas, 1837, 1839, 1842, 1853; St. Francisville, 1811, 1817, 1819, 1823, 1827, 1829, 1839, 1843, 1846, 1848, 1853; Shreveport, 1853, 1873 (mortality 759); Port Hudson 1839, 1841, 1843, 1853, 1878; Thibodeaux, 1846, 1853, 1854, 1878; Washington, 1837, 1839, 1852, 1853, 1854, 1867; Morgan City, 1878 (mortality 109), and numerous smaller places during the epidemics of 1873 and of 1878.

*Texas*.—The epidemics at Galveston are included in our table. Houston, 1839, 1844, 1847, 1848, 1853, 1854, 1858, 1859, 1864, 1867, 1870; Huntsville, 1867 (mortality 130); Hempstead, 1867 (mortality 151); Indianola, 1852, 1853, 1858, 1859, 1862, 1867 (mortality 80); LaGrange, 1867 (mortality 200); Matagorda, 1862 (mortality 120); Navasota, 1867 (mortality 154); Rio Grande City, 1867 (mortality 150); Victoria, 1867 (mortality 200); Brenham, 1867 (mortality 120); Calvert, 1867 (mortality 250); Chapel Hill, 1867 (mortality 123); Columbia, 1867 (mortality 132); Brownsville, 1853, 1858, 1862, 1882.

*Tennessee*.—Memphis, 1828, 1853, 1855, 1867, 1873 (mortality 1,244), 1878 (mortality 5,000), 1879 (mortality 485); Chattanooga, 1878 (mortality 135); Brownsville, 1878 (mortality 212); numerous smaller towns in 1878.

*Arkansas*.—Columbia, 1853; Fort Smith, 1823; Little Rock, 1873; Napoleon, 1853.

*Kentucky*.—Bowling Green, 1878; Hickman, 1878 (mortality 153); Louisville, 1878 (mortality 64).

*Ohio*.—Cincinnati, 1871, 1873, 1878 (mortality 17); Gallipolis, 1796, 1878 (mortality 18).

*Illinois*.—Cairo, 1873 (mortality 17); 1878 (mortality 51).

*Missouri*.—St. Louis, 1854, 1855, 1878 (mortality 16); New Design, 1797 (mortality 57).

#### *Great epidemics in the United States.*

1793.—The city of Philadelphia, after enjoying an immunity from Yellow Fever for thirty-one years, suffered in 1793 a devastating epidemic. This epidemic, no doubt resulted from importation, although a clear history of its introduction was not made out at the time, and the leading physicians of the city were inclined to attribute it to local origin, as a result of unsanitary conditions in connection with an unusually high temperature. La Roche says: "Dr. Rush and others laid great stress on a quantity of



damaged coffee which was exposed during the latter part of July in a place (on a wharf and in the adjoining dock) and under circumstances which favored decomposition. Its smell was highly putrid and offensive, insomuch that the inhabitants of the houses in Water and Front streets, who were near to it, were obliged in the hottest weather to exclude it by shutting the doors and windows. Even persons who only walked along those streets complained of intolerable fetor, which, upon inquiry, was constantly traced to the putrid coffee."

It appears probable that this "putrid coffee" was indeed the *nidus* in which the deadly exotic germ first developed which gave rise to this fatal epidemic. Whether the coffee was infected at the port of shipment or whether it was transported in an infected vessel we can not now determine; but that the outbreak of yellow fever in Philadelphia was due to the fact that the coffee was imported from a region where yellow fever was prevailing or in an infected ship, rather than to the fact that it was putrid, can not be doubted, in view of the subsequent history of yellow-fever epidemics in the United States.

As usual the early cases were not recognized as yellow fever. Dr. Rush says:

"The report of a malignant and fatal fever being in town spread in every direction, but it did not obtain universal credit. Some of those physicians who had not seen patients in it denied that any such fever existed, and asserted (though its mortality was not denied) that it was nothing but the common annual remittent of the city. Many of the citizens joined the physicians in endeavoring to discredit the account I had given of the fever, and for awhile it was treated with ridicule or contempt. Indignation in some instances was exerted against me."

History has repeated itself, in this particular, many times in subsequent epidemics. The early cases, even in cities like New Orleans, where the physicians are well acquainted with the disease, are frequently called by some other name—"bilious fever," "pernicious fever," "malarial fever," etc.—and the physician who first ventures to name the prevailing disease of "yellow fever" is treated with ridicule or with indignation.

It was not until the middle of August that a rapid succession of fatal cases convinced the physicians of the city that the fatal West Indian pestilence was again present in Philadelphia.

The presence of the disease was officially recognized on the 22d of August, when the mayor of the city gave orders for the cleaning of streets and general purification of the city. The disease continued to extend until early in October, when it reached its height. It did not cease entirely until about the 8th of November. During this short season of prevalence it caused an enormous mortality, distributed as follows: "August, 325; September, 1,442; October, 1,976; November, 118." (La Roche.)

The population of the city at this time is estimated to have been a little more than 40,000, which gives a mortality of 10 per cent. of the total population (total mortality, 4,040). As more than 12,000 of the inhabitants fled from the city, the proportion of those who were attacked is very great. La Roche estimates the total number of cases at 11,000.

1797.—The epidemic of this year in the city of Philadelphia was less extended and less fatal. The whole number of deaths is estimated to have

been about 1,300. The disease, as usual, commenced in the vicinity of the wharves (about the end of July). Unsanitary conditions, described by physicians who were witnesses of the epidemic, furnished the favorable local nidus for the exotic germ, which, according to a report of the College of Physicians of Philadelphia, made in response to a request from the governor, was imported by two vessels, one from Havana, and the other from Port au Prince. In this report the College of Physicians, contrary to the prevailing popular opinion and that of many prominent physicians, took the ground that the unsanitary local conditions were simply secondary or accessory causes, and recommended "a more stringent system of quarantine regulations as the most effectual means of preventing the recurrence of the disease." (La Roche.)

1798.—The epidemic of 1797 was followed the next year by a still greater one, which was not confined to the city of Philadelphia alone. The disease prevailed also in Boston (mortality 200), in Portsmouth, N. H. (mortality 100), in Newport, R. I. (mortality 2), in New London, Conn. (mortality 81), in New York (mortality 2,080), in Wilmington, Del. (mortality 250), and in Charleston, S. C. The mortality in Philadelphia was 3,645, distributed as follows: August, 626; September, 2,004; October, 943; November (from the 1st to the 5th), 72. The mortality, in proportion to the number of cases in the city of Philadelphia, was enormous, being, according to La Roche, about as 1 to 1.27 of those attacked, or nearly 80 per cent. This is accounted for partly by the fact that the better classes of the community left the city as soon as possible after the outbreak of the disease, and the cases which occurred were consequently among the poorer classes, who inhabited the worst portions of the city. The prevailing ideas as to the treatment of fevers by depleting measures were doubtless responsible to some extent for the excessive mortality. "The College of Physicians, faithful to the theory so long entertained by it in relation to the cause of the disease, assigned to the epidemic this year, as it had done to those of preceding seasons, a foreign origin." (La Roche.)

1802.—An epidemic of smaller proportions prevailed in the year 1802, causing a mortality in Boston of 60, in Philadelphia of 307, in Wilmington of 86, in Charleston of 96. The disease also prevailed "extensively" in Baltimore, but no record of mortality is given. The prevalence of the disease at the sea-ports mentioned, especially before the time of railroad communication, is not to be ascribed to an extension from one to the others, or to "an epidemic constitution of the atmosphere;" but it doubtless occurred, for the most part, as a result of independent importation from the usual source of the disease—the West Indies. Thus we find that in 1802, while Boston and Philadelphia suffered epidemics, New York, lying between the two infected points, was free from the disease; two cases only are reported.

1853.—Passing over the minor epidemics, for the most part limited to a single city, or by coincidence merely to two or more distant sea-ports, we come to the epidemic of 1853, which extended through portions of the States of Florida, Alabama, Louisiana, Mississippi, Arkansas and Texas. The towns which suffered in *Florida* were Pensacola, Milton, Tampa. In *Alabama*, Mobile (mortality 115), Cahaba, Citronelle, Demopolis, Fulton,

Hollywood, Montgomery (mortality 35,) Selma (mortality 32), were the principal towns visited by the scourge. In *Louisiana*, the disease prevailed at New Orleans, with a mortality of 7,970, at Alexandria, Algiers, Bay St. Louis, Bayou Sara, Centreville, Clinton, Coultierville, Franklin, Opelousas, Pattersonville, Plaquemine, Shreveport, Thibodeaux, Trenton, Washington, and various smaller places. In *Mississippi*, Biloxi, Brandon, Clinton, Grand Gulf, Greenwood, Jackson, Natchez, Pascagoula, Pass Christian, Port Gibson, Washington, Woodville, Yazoo. In *Arkansas*, Columbia, Grand Lake, Napoleon. In *Texas*, Brownsville, Cypress City, Galveston, Hockley, Houston, Indianola, Liverpool, Richmond, Saluria.

1867—The epidemic of this year was widely extended in the State of Texas. The first recognized case in New Orleans occurred on the 19th of June. The total mortality in this city was 3,093. Other towns visited in Louisiana were New Iberia and Opelousas. In *Texas*, the first cases occurred at Galveston on the 26th of June, and the total mortality in this city was 1,150. Other places visited by the epidemic were Alleyton, Anderson, Austin, Bastrop, Brenham, Calvert (mortality 250), Chapel Hill, (mortality 123), Corpus Christi, Danville, Goliad, Hempstead (mortality 151), Huntsville (mortality 130), Independence, Indianola (mortality 80), La-Grange (mortality 200), Liberty, Millican, Navasota (mortality 154), Oldtown, Port Lavaca, Rio Grande City (mortality 150), Victoria (mortality 200).

1873.—Florida, Alabama, Mississippi, Louisiana, and Texas again suffered from an epidemic of yellow fever in the year 1873. At Pensacola, Fla., the first recorded case occurred August 6, and the total mortality was 61. In *Alabama* the disease appeared at Mobile on the 21st of August, and the total mortality was but 27; Montgomery suffered a loss of 102. In *Louisiana* the mortality in the city of New Orleans was only 225, although the epidemic had its origin in this city. It was imported by the Spanish bark *Valparaiso*, which sailed from Havana, June 15, in ballast; arrived at the New Orleans quarantine station June 24; was detained two days, and came to the city June 26. The first case was the mate of this vessel, who was taken sick on board, July 4, while she was lying at the wharf. But for the sickness and death of the mate of the *Valparaiso*, the origin of this epidemic would have remained obscure and the believers in the local origin of the disease would have had a strong case, for no other cases of the disease occurred on the *Valparaiso*. This is explained by the fact that the crew consisted of acclimated Spaniards, and the mate seems to have been the only susceptible person on board who could serve as a test of the infection of the vessel at her port of departure. From New Orleans the disease was carried to Memphis by the river steamer *Bee*. It caused a mortality in this city of 2,000. River steamers from New Orleans also carried the disease to Shreveport, La., where the mortality was 759. From Shreveport a refugee fled to the town of Calvert, Tex., where he was taken sick and died; an epidemic followed with a total mortality of 125. The disease was also introduced by refugees to the town of Marshall, Tex., where 36 deaths occurred. The epidemic of this year at Pensacola, Fla., was due to an independent importation, by the ship *Golden Dream*, and Montgomery, Ala., became infected through refugees from Pensacola.



The great epidemic of 1878, which invaded 132 towns and caused a mortality of nearly 16,000, has already been referred to. This was followed in 1879 by a second epidemic in the city of Memphis, Tenn. Since this date the only notable epidemic has been that which occurred in Florida and adjacent States during the past year (1888). This is still fresh in the minds of our people, and its disastrous effect upon the prosperity of the State in which it occurred, as a result of importation from Havana, is also well known.

The preceding historical record shows that in the United States, as elsewhere, yellow fever has prevailed more frequently in sea-ports than in inland towns, and that, when epidemics prevail in the interior, their origin can commonly be traced to the nearest sea-port, or to intermediate towns in communication with it. Towns upon or near the coast which have no commerce are no more subject to invasion by yellow fever than are interior towns, unless it be by reason of their proximity to a seaport. Moreover, the frequency of epidemics in our Southern sea-ports, before the era of efficient quarantine administration, bears a direct ratio to their commercial importance, and especially to their commercial intercourse with Havana or other endemic foci of the disease. Thus New Orleans suffered epidemics of greater or less magnitude in forty-eight out of the first sixty years of the present century. During the same period (1800-'60) Charleston suffered 28 epidemics; Mobile, 22; Pensacola, 17; Savannah, 9; Galveston, 7. That local conditions are favorable for the development of an epidemic at many of our interior towns, especially those located on great rivers, near the sea-level, in the Southern States, is amply proved by the epidemic of 1878. That yellow fever does not occur at these towns, except as a result of the introduction of infected persons or articles, is beyond question. So, too, in sea-port cities there is no reason for believing that any radical change has occurred in the local conditions during the past twenty-eight years; yet during this time New Orleans has only suffered 6 epidemics, while during a corresponding period (twenty-eight years) prior to 1860 there were twenty-two years of epidemic prevalence of the disease. A similar comparison for Charleston shows fourteen years of epidemic prevalence prior to 1860, and only one since.

As to the nature of the specific cause of yellow fever there can scarcely be two opinions. The present state of science

justifies the belief that it is a living micro-organism, and facts relating to the origin and extension of epidemics show that, as in cholera and in typhoid fever, this micro-organism is capable of development outside of the human body under favorable conditions as to temperature, soil, etc. Unfortunately the present state of science does not enable us to give an account of the exact nature of the deadly microbe, which we assume to be the cause of the disease under consideration. We know to-day the morphological and physiological characters and the habitat within the body of an infected individual of the specific cause of cholera, of typhoid fever, and of relapsing fever, but the researches made up to the present time have failed to demonstrate the "germ" of yellow fever.

The occurrence of epidemics in the future as extended as those of the past, or even more so, inasmuch as the area most subject to invasion is rapidly becoming more populous, will no doubt depend, as in the past, upon the importation to our shores *by ships* of the specific infectious agent ("germ") which gives rise to the disease. Sanitarians are therefore justified in calling upon those interested in commerce to assist them in their efforts to prevent such introduction and the consequent loss of life and property. Popular sentiment in some of our southern sea-ports is now so much aroused as to the importance of this matter that there is a feeling on the part of many that non-intercourse with infected ports is preferable to commerce with the risks attending it of the importation of the exotic germ. This is not, however, advocated by the sanitarians of the country. On the contrary, we believe that it is practicable to reduce these risks to such an extent that commerce may flourish even in our Gulf and Southern Atlantic ports, with comparative safety to the people, and without any serious hindrance to the prompt discharge of cargoes from infected ports. How this may be accomplished we will consider later.

The historical data given show that while our most vulnerable sea-ports are those upon the Gulf and the Southern Atlantic coast, yet the disease may prevail, and has prevailed as recently as 1870 as far north as New York (epidemic upon Governor's Island in New York harbor). The diminished frequency of its prevalence as we go north is due to two factors; the less favorable climatic conditions for the epidemic extension of the disease, and the increased distance from permanently infected ports. For the ports of Northern Europe these two factors

constitute a complete exemption from the danger of invasion, and no restrictive measures are considered necessary. But in Spain the climatic conditions are favorable for the development of the disease when introduced, as it has been a number of times with disastrous results. Its greater distance from the permanent foci of the disease is, however, in its favor as compared with the United States, and the historical record shows that we have suffered much more frequently, although Spain has very constant communication with Havana, which may be looked upon as the principal focus of the disease in the West Indies.

The permanent infection of Havana since the introduction of the disease to that city in 1761 (see historical record), is no doubt due to local unsanitary conditions which are, to a considerable extent, at least, remediable. But the expense attending the radical changes and improvements which would be necessary in order to put this city in a complete state of sanitary defense against its endemic scourge would be enormous, and there seems to be no immediate prospect that any serious effort will be made in this direction. Nor can we fairly demand of our Southern neighbors that they exclude yellow fever from their harbors by sanitary improvements, unless we, by similar measures, place our own exposed sea-ports in a state of sanitary defense.

The proximity of Havana to our own shores, and the considerable commerce between this port and ports in the United States which are but a few days distant from it even for sailing vessels, makes this the infected port from which we have most to fear, and as a matter of fact it is the port from which yellow fever has been most frequently introduced into this country.

Rio de Janeiro, which is also a permanently infected port, is so remote that it would constitute a comparatively small danger even if our commerce with this city were largely increased. Another element of safety in our intercourse with Rio de Janeiro and other ports south of the equator consists in the fact that the epidemic season is during our winter and spring months, when, owing to climatic conditions, we are comparatively safe from invasion by the tropical plague. The epidemic season in Rio, commencing in November, is over by the first of May, although a few cases continue to occur throughout the year, whereas our vulnerability to invasion, even in the



Gulf States, scarcely commences before the first of May. There is, however, a certain amount of danger of infection from this source which can not be ignored, inasmuch as a few cases continue to occur in Rio during the non-epidemic months, and as vessels from that port sail through tropical waters, and if infected at the port of departure are liable to remain so notwithstanding the length of the voyage.

Although Vera Cruz is a permanently-infected port, as shown by our mortality statistics relating to this city, it has not heretofore proved as great a source of danger to this country as the port of Havana. This, I believe, is chiefly due to circumstances relating to the loading and discharging of vessels. At Vera Cruz this is done by means of lighters, as there is no inclosed harbor, as at Havana, and ships can not lie up to wharves for receiving and discharging cargo.

In the harbor of Havana there is abundant evidence that vessels which lie up to the wharves become infected far more frequently than those which lie out in the harbor to the windward of the infected town and are loaded from lighters. This is now so well recognized that all of the American lines of steamers sailing to Havana anchor in the open bay and avoid direct communication with its shores. As a result of this precaution and the enforcement of other sanitary measures these steamers have rarely, if ever, become infected. Even on the short line between Tampa and Havana, where the trips are frequent and the route might be regarded as an open door for the admission of yellow fever to the United States, so far as I can learn no cases have occurred upon the steam-ships engaged in this service, and there is no evidence of the importation of the disease to our shores by this route. This result, I think, may properly be attributed to the extraordinary precautions taken and to the maintenance by our Government of an efficient sanitary inspector in the city of Havana, whose duty it is to supervise the sanitary condition of all vessels sailing to our ports, and to see that such regulations are enforced at the infected port as we deem essential for the safety of the port of destination in the United States.

Without doubt a more extended commerce with our Southern neighbors will bring about increased dangers of the kind referred to in this paper and illustrated by the long list of epidemics recorded in our historical record. But the writer firmly believes that these increased dangers can to a large ex-

tent be neutralized by the intelligent application of proper preventive measures, and that the confidence which would be inspired by a well-organized sanitary service in connection with the commerce we are seeking would in itself be one of the most potent adjuvants in developing this commerce.

We now proceed to consider the *methods* by which, as we believe, our commercial and sanitary interests may be reconciled.

These relate to the supervision and sanitary treatment of ships at infected ports during transit and upon their arrival at our vulnerable ports during the season favorable to the development of an epidemic.

And first, as to *ships* in general. What has heretofore been said indicates that the danger diminishes to some extent with the length of the voyage. Yellow fever has never been transported to India, to China, or to the east coast of Africa. It might then be inferred that there is less danger from sailing vessels than from steamers, as more time is occupied in the voyage between given ports. This is to a certain extent true, but there are other factors to be considered, which give steamships the advantage from a sanitary point of view, when they belong to a regular line stopping at infected ports for passengers and freight.

These advantages, however, do not apply to "tramp" steamers, which now carry much of the freight to and from the ports of South and Central America. Steamships of a regular line are usually provided with officers familiar with the special service required of them, and often with a medical officer, and so far as possible with an acclimated crew. In his own interest and that of the owners the master of such a vessel will take such precautions as he deems necessary to prevent his vessel from becoming infected; for he knows that detention at the port of arrival entails serious loss and that a clean sanitary record is one of the best cards for his vessel and the line to which it belongs. Such vessels also receive and discharge cargo promptly, and are detained for the shortest possible time at the infected port, whereas "tramp" steamers and sailing vessels frequently remain at the wharves for weeks waiting for a cargo. The discipline upon vessels of a regular line is also better, and during the short stay in a dangerous port the crew may be kept on board the more readily as such vessels commonly anchor in the harbor and receive and discharge cargo

by means of lighters. On the other hand, the crews of "tramp" steamers and of sailing vessels, when these tie up to the wharves, are often exposed while on board ship in the most dangerously-infected localities, and are with difficulty restrained from those excesses which are conducive to an attack. The result is that in permanently-infected ports like Havana or Rio de Janeiro, for example, the crews of such vessels furnish a large contingent to the mortality lists, and vessels are frequently thoroughly infected at the time of sailing, or become so by the occurrence of cases on board soon after leaving port.

That the danger of infection is comparatively slight for steamers of regular lines when proper precautions are taken, is shown by the sanitary record of the American line of steamers sailing between New York and Rio de Janeiro and the several lines sailing from the same port to Havana and to Vera Cruz. Tramp steamers, and to a certain extent sailing vessels at the present day, are adventurers which seek a freight wherever it may be found, and not infrequently the masters of such vessels, recklessly or ignorantly, go into infected ports at the height of the epidemic season and tie up to the wharves in the most dangerous localities. Such a vessel, thoroughly infected, may sail to one of our ports, and upon her arrival the health officer may not discover any evidence of the fact; for the master is not disposed to give information which may lead to delay and expense at the quarantine station, and there may be no sickness on board at the time of arrival simply because all susceptible members of the crew passed through the disease at the port of departure or upon the high seas, or possibly because the crew is acclimated to it.

Consular bills of health, at ports where there is no sanitary inspector, have but little value in determining the question of admitting such vessels upon their arrival. It is notorious that "clean bills of health" are frequently given by consuls or consular agents when it is known to the health officers receiving them, through the newspapers or by other channels, that cases of yellow fever or of small-pox were occurring daily at the time of sailing. It can not be expected that the consul, who is not usually a physician or a sanitary expert, who is often a very busy man, and who is perhaps directly interested in the commerce of the port, will give much attention to this matter. The bill of health is too often given in a perfunctory manner,



without special inquiry as to the sanitary history of the vessel, or as to the presence of infectious disease in the port.

It is for this reason that we consider it necessary to have *sanitary inspectors*, in the employ of the National Government, at all permanently infected ports with which we have intimate commercial relations. The duties of these inspectors should be to inform masters of vessels intending to load for ports in the United States of the quarantine regulations at the port of entry; to advise them as to the measures to be taken which will best insure their crews and vessels against infection, and by which they may meet the requirements of the port of destination and thus escape detention; to note the character of the ballast of ship sailing "in ballast," and to protest against the use of earth ballast from infected localities; to inspect the vessel before she takes in her cargo and cause her to be cleansed and disinfected if necessary; to note the character of the cargo and object to the reception of articles considered dangerous; and finally to carefully inspect the ship, together with her passengers and crew immediately before she sails, and to note upon her bill of health all points relating to her sanitary history which may be of use in determining the action of the health officials at the port of arrival.

It is true that we can not give authority to such sanitary inspectors to board and inspect vessels in foreign ports sailing under other flags than our own. But the question of authority is not likely to be raised, inasmuch as the inspection is in the interest of the master and of the owners of the vessel; for if it is declined he will fail to receive the papers necessary to enable him to pass the scrutiny of the health officials at the other end of the line, and may be subjected to detention and expense which by a different course would have been avoided. At Havana, where we have had a sanitary inspector for several years, there is no difficulty on the score of authority; and there is no question as to the great value of the inspection service at that port. Indeed without it, the health authorities of Florida would scarcely consent to the frequent intercourse with Havana, during the summer season, which is now kept up by the Tampa line of steamers.

Having outlined the protective measures which should be taken at the port of departure, when this is an infected port, we may briefly refer to those which should be carried out during the voyage.

First, ships should be kept clean and properly ventilated. Foul ships are especially liable to become infected when in port, or upon the high seas if a case of yellow fever occurs on board after sailing. A clean ship may often escape infection, even when cases, resulting from exposure on shore, occur on board. The occurrence of a case within four or five days after leaving an infected port can not be taken as evidence that the ship is infected, and by proper measures of isolation and disinfection such cases may often be treated on board without danger to the rest of the passengers and crew. For this reason all passenger vessels sailing to yellow-fever ports should carry a medical officer, and should be provided with an isolation ward preferably in the after part of the ship. This, in the long run, would no doubt be found a matter of economy to the owners.

The occurrence of cases at a later date than that mentioned—five days—and especially of a series of cases, must be taken as evidence that the vessel is infected, and upon her arrival at a port in the United States during the warm season will call for certain precautionary measures on the part of the port health officer which we may refer to under the general heading quarantine.

In the United States, as well as in European countries, the word *quarantine*, although still applied to the sanitary inspection service at sea-port cities, represents something entirely different from the forty days' detention of former times, with its attendant hardships, and too often barbarities as regards the treatment of the unfortunate passengers and crew of vessels subjected to this detention.

It is now generally agreed by sanitarians in this country that an arbitrary time quarantine is an unnecessary burden upon commerce, and that it does not afford as great security against the introduction of exotic diseases as can be obtained by other methods. To detain vessels from infected ports for a fixed time without reference to the length of time they remained in the dangerous port, to their sanitary history while there or subsequently, to the length of the voyage, etc., is unreasonable. And the detention of an infected vessel for any given time does not diminish the danger of admitting her to the wharves of a city, unless she has in the meantime been thoroughly disinfected. The time of detention for an infected vessel should therefore be no longer than is required for her

thorough purification and disinfection; and this will differ according to the circumstances relating to her character, the nature of her cargo, etc.

In this country the National Government has provided a number of "refuge stations" conveniently located with reference to our principal ports, where infected vessels are sent for such treatment as is considered necessary.

The first question which presents itself is: Upon what evidence should a vessel be pronounced *infected*? The only conclusive evidence of the infection of a vessel is the occurrence of cases of an infectious disease as a result of exposure upon it. Thus if cases of yellow fever occur upon a vessel after she leaves the port at a date later than the usual period of incubation of this disease, the inference is that the disease was contracted as a result of exposure on shipboard and that the vessel is infected. The period of incubation in yellow fever is believed by those who have most carefully studied this question to be, as a rule, within five days, and cases occurring at a later date than this can not properly be ascribed to exposure before sailing. Cases occurring while in port, or at an earlier period than five days after sailing, may be due to exposure on shore, and can not be taken as conclusive evidence that the vessel is infected, unless followed by other cases at a later date.

Thus, if a clean steamer touching at Vera Cruz or Havana for passengers should have within five days a case of yellow fever develop among the passengers who came on board at the infected port, or if a member of the crew who had been exposed on shore should fall sick with this disease, and if no other case developed on board, it would be a proper assumption that the disease was contracted on shore and not on the ship. And if such a steam-ship has complied with the sanitary regulations heretofore mentioned while in port, and the person or persons falling sick had been placed in an isolation ward and proper measures of disinfection enforced during the voyage, the vessel itself and her well passengers could be permitted to pass the quarantine station after removal of the sick and the disinfection of the apartment occupied by them, provided five full days had elapsed since the case or cases occurred. This, however, should only apply to regular passenger-ships which remain but a short time in the infected port, without going to the wharves, and which carry a medical officer. Any vessel



which has been at the wharves of an infected port for a day or more during the epidemic season, even if no cases have occurred on board, should be regarded as *possibly infected* and dangerous. At our Southern sea-ports prudence demands that such a vessel be unloaded at the quarantine station and thoroughly disinfected before she is allowed to come to the wharves of the city. For this purpose quarantine stations should be supplied with facilities for discharging vessels upon lighters and for disinfecting them by the most approved methods. As this mode of treatment calls for no more *time* than is necessary to accomplish the desired purpose, the interests of commerce demand ample facilities for the prompt execution of these measures. The passengers and crews of such vessels should be permitted to go to the city without detention if five days have elapsed since leaving the infected ports, but special care should be exercised with reference to personal baggage. No soiled clothing or bedding from an infected port or from a ship coming under the heading "infected" or "possibly infected" as above defined, should be admitted without previous *disinfection*.

When the voyage from the infected port is of less than five day's duration, *unacclimated persons* should be detained at the quarantine station for observation until the expiration of this period. By "unacclimated persons" we mean such as have not suffered an attack of yellow fever, or given evidence of immunity from the disease by long residence in one of its endemic foci, *e. g.*, natives of the city of Vera Cruz, Havana, or Rio de Janeiro.

With reference to the *cargoes* of vessels from infected ports we would say that in general all articles of merchandise in good condition should be admitted without detention or special treatment. But in the case of vessels sent to a refuge station as "infected" or detained at a quarantine station as "possibly infected" it will be prudent to fumigate the cargo with sulphur dioxide, and then to expose the packages freely to the air before permitting them to go to the city. Articles subject to putrefactive changes, such as hides, dried meats, vegetables, fruits, etc., coming from infected ports, when in bad condition should not be permitted to pass the quarantine station.

We have now given a brief general outline of the methods by which we believe our commercial and sanitary interests can best be reconciled. There are many technical details which would be out of place in this paper, but with which it is es-

essential that the officials intrusted with the execution of these important measures of public safety should be thoroughly familiar. And here we are brought in face of a serious difficulty in the way of securing the best results as regards the public health, with the least possible interference with commerce. Unfortunately, we have not a uniform system of quarantine administration throughout the United States, and no guaranty can be given that the service will be placed in the hands of competent officials by the several municipalities, or States, in which our numerous sea-ports are located. Yet any negligence at a single port may result in a national calamity. The General Government has, however, made a commencement by the establishment of refuge stations, and by maintaining a sanitary inspector at one of the most dangerously infected ports—Havana. It is to be hoped that further steps will be taken in the same direction, and that eventually we will have a national sanitary inspection and quarantine service, whose duty it shall be not only to guard against the introduction of exotic pestilential diseases, but also to investigate the causes of endemic infectious diseases, such as tubercular consumption, typhoid fever, and diphtheria, which annually carry off thousands of victims in all parts of the country, and to suggest measures for restricting the ravages of these and other "preventable diseases."

Further, in the reconciliation of our commercial and sanitary interests and as a matter of common justice, the expense of supporting this national health service should be borne by the people protected by it, *i. e.*, from the national treasury, and should no longer be made a tax upon commerce. American ships, at least, upon the condition of their complying with our sanitary regulations, should be relieved from all quarantine fees. The losses resulting from the detention of ships at quarantine stations are certainly a sufficient tax upon commerce, without making it pay all of the expense of the entire service, as is now the custom.

There are abuses also connected with the service as at present conducted which constitute an unjust tax upon commerce such, for example, as the perfunctory and farcical "disinfection" of ships which are not infected for the sake of the fee allowed by law for such a procedure. Then, too, great hardship often results to passengers with limited means from the unlooked-for expenses to which they are subjected upon their



arrival at quarantine stations. Those who are so unfortunate as to suffer detention for the protection of others should certainly be relieved from every unnecessary burden. They should be well fed, well sheltered, and if sick should receive the best possible care and skillful medical attendance, without any expense to themselves. A great Government like ours can afford to be liberal in such matters. Or if this is not a sufficient argument for our legislators let them consider the question from an economic point of view. Such a national health service as we have outlined would pay both in the increased facilities which it would afford for more intimate commercial relations with our neighbors of Central and South America, and in the superior protection afforded to the people of the country against such epidemics as we have suffered in the past and the enormous pecuniary losses which they entail.





